

MEMORANDUM

To: Cynthia Mancha, City of Brawley, Development Services - Planning Division

From: Dennis Dinh, Michael Baker International
Zhe Chen, Michael Baker International

Date: April 22, 2025

Subject: **Brawley Mixed Use Master Plan Project – Noise and Vibration Assessment**

PURPOSE

The purpose of this technical memorandum is to evaluate potential short- and long-term noise and vibration impacts that would result from the construction and operation of the proposed Brawley Mixed Use Master Plan Project (project), located in the City of Brawley (City), California.

PROJECT LOCATION

The approximately 66-acre project site is located in the northern portion of the City of Brawley in south-central Imperial County (County), California; refer to Exhibit 1, Regional Vicinity Map. The Cities of Imperial and El Centro lie approximately 9 miles and 13 miles, respectively, to the southwest. The international United States/Mexico border is located approximately 22 miles to the south.

The project site is located south of (future) Legion Road, east of Brawley Avenue/State Highway 86, and north of Rockwood Canal; refer to Exhibit 2, Site Vicinity. The affected County Assessor Parcel Number is 048-440-001. The site currently supports agricultural use. Regional access to the project vicinity is provided via Interstate 8, located approximately 14 miles to the south.

PROJECT DESCRIPTION

The project proposes an amendment to the Brawley Gateway Specific Plan to subdivide the property and allow for future commercial and multi-family residential uses; refer to Exhibit 3, Site Plan. Specifically, the western portion of the project site (approximately 36 acres) would be subdivided into 11 pads for future commercial uses. Pads 1-8 would include commercial buildings ranging from approximately 3,200 square feet (SF) to approximately 15,600 SF and are intended to support strip retail plaza uses. Pads 1-8 would have a combined building square footage totaling approximately 65,500 SF. Pads 10-11 would have a combined building square footage totaling approximately 243,000 SF and would support larger retail shopping center uses. Additionally, Pad 9 is anticipated to support a commercial hotel with approximately 150 rooms and an estimated building square footage of approximately 122,905 SF. Onsite parking would be provided for the proposed uses in conformance with City Zoning Ordinance requirements. Specifically, the commercial component of the proposed project would provide a total of 1,890 standard surface parking spaces.

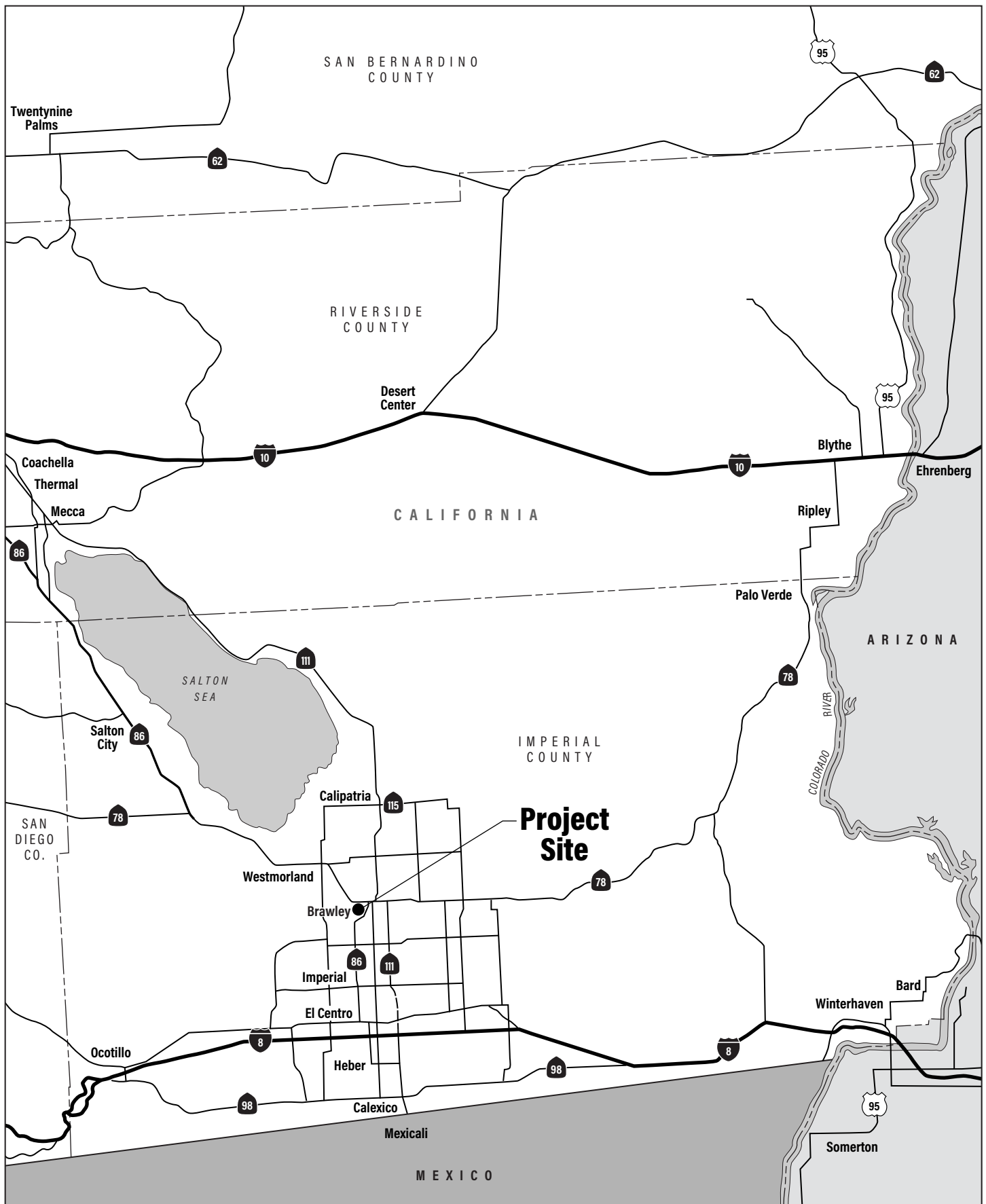
The eastern portion of the project site (approximately 29 acres) would be subdivided for the development of 408 multi-family residential units with varying floor plans. The residential component of the proposed project would provide a total of 836 parking spaces, including 216 attached garage spaces and 620 standard surface parking spaces. The residential area would offer community amenities including a dog park, clubhouse, pool, and fire pit as well as several community parks and green space for resident use and would provide opportunities for passive and active outdoor recreation.

Primary access to the commercial component of the proposed project would be provided via (future) Legion Road to the north; secondary access would be provided via a future/unnamed road to the south. Access from the north would require improvement of Legion Road to the centerline along the northern property boundary. The new access road along the southern boundary would be constructed above the existing canal (Rockwood Canal). Construction of this roadway would occur in coordination with the Imperial Irrigation District which owns and operates the canal.

Access to the proposed residential uses would be provided via (future) Legion Road to the north; secondary access would be provided via a future road along the eastern boundary of the project site.

Operation of the proposed project would include the proposed 408 multi-family residential units on the eastern portion of the project site and future commercial uses on the western portion of the project site. The future commercial uses would operate consistent with the applicable zone, zoning regulations, and conform with allowed business hours. However, it should be noted that operating hours may vary depending on the specific use proposed (i.e., retail shopping center versus commercial hotel use). All parking demands generated by the residential and commercial components of the project would be accommodated on-site. The need for any off-site parking (i.e., street parking) would not be anticipated or proposed.

Construction activities would include grading, building construction, paving, and the application of architectural coatings. Construction activities would occur over approximately 33 months. The proposed earthwork would result in approximately 20,000 cubic yards of soil import.



BRAWLEY MIXED USE MASTER PLAN PROJECT - NOISE AND VIBRATION ASSESSMENT



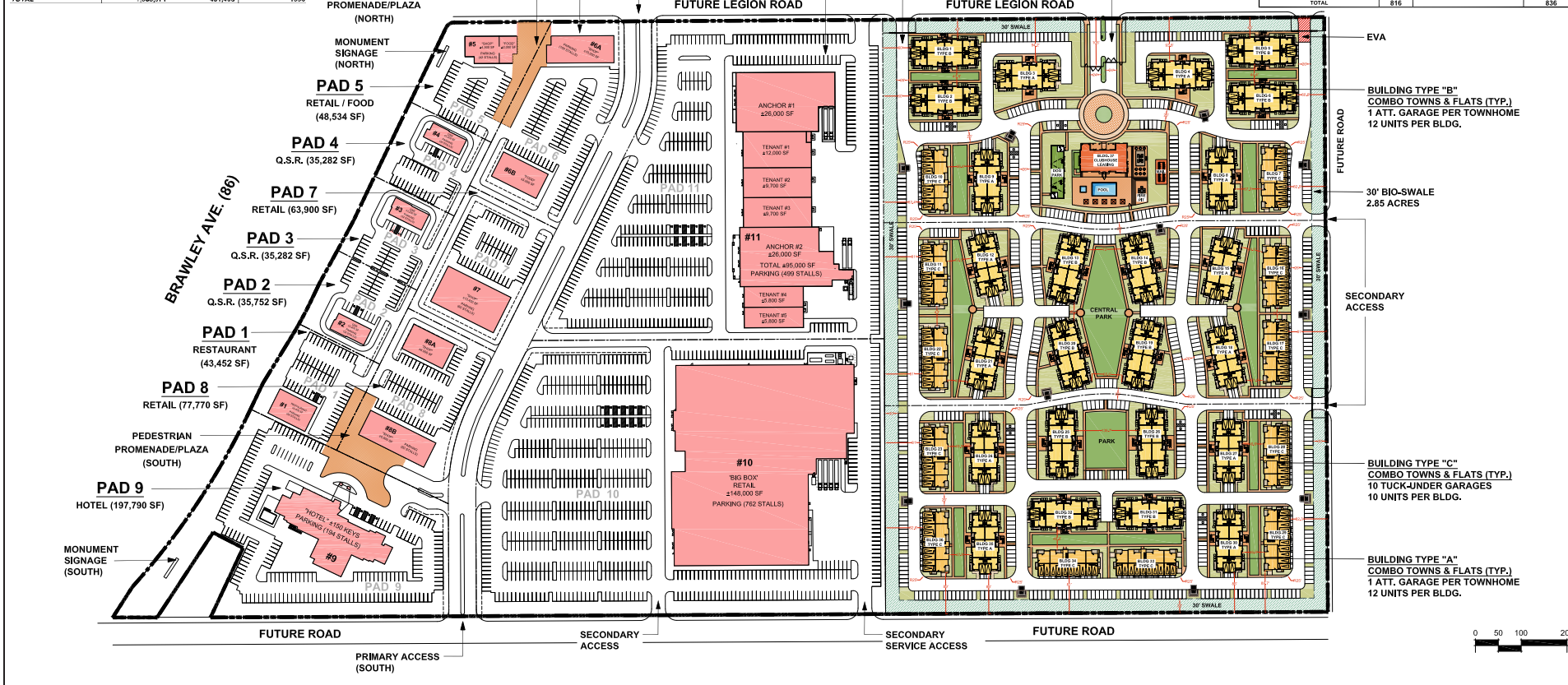
NOT TO SCALE



Source: Google Earth Pro, October 2024

COMMERCIAL PAD SUMMARY TABLE			
SITE AREA		36 ACRES	
PAD SUMMARY			
PAD NUMBER	LOT SIZE (SF)	TOTAL BUILDING AREA (SF)	NO. OF PARKING PROVIDED
#1 (RESTAURANT)	43,452	5,400	56
#2 (Q.S.R.)	35,753	3,200	32
#3 (Q.S.R.)	34,790	3,200	32
#4 (Q.S.R.)	35,282	3,200	32
#5 (RETAIL / FOOD 30%)	48,534	6,500	42
#6 (RETAIL / FOOD 30%)	90,933	15,000	100
#7 (RETAIL / SHOP)	63,900	13,400	60
#8 (RETAIL / SHOP)	77,770	15,600	80
#9 (HOTEL 150 KEYS)	197,790	122,005	194
#4 (BIG BOX RETAIL)	520,942	148,000	767
#4 (BIG BOX RETAIL)	420,755	95,000	499
TOTAL	1,588,971	431,405	1890

APARTMENT SUMMARY TABLE				
SITE AREA		28,77 ACRES		
TOTAL UNITS		408 UNITS		
DENSITY		14.2 DU/AC		
APARTMENT UNIT SUMMARY				
BLDG. #	SQ. FT.	UNITS	KEYS	TOTAL SQ. FT.
BLDG A - UNIT 1	760	1/1	48	36,480
BLDG A - UNIT 2A	1053	2/2	48	50,544
BLDG A - UNIT 2B (TH)	1200	2/2.5	48	57,600
BLDG B - UNIT 2A	1053	2/2	96	101,088
BLDG B - UNIT 2B (TH)	1200	2/2.5	48	57,600
BLDG C - CARRIAGE 1	715	1/1	24	17,160
BLDG C - FLAT 1	760	1/1	24	19,240
BLDG C - FLAT 2	1040	2/2	48	40,800
BLDG C - TH 1	1220	2/2.5	24	29,280
TOTAL			408	273,288
1.08 Acres are allocated for future change based on new scenario 1.08 DU/AC				
PARKING SUMMARY			PROPOSED	
REQUIRED (per Bradley Creek Code Table 20-4C)			ATTACHED GARAGES	
2 BDRM + 2 carmax/1 hr			000	
TOTAL			816	
TOTAL			816	
TOTAL			STANDARD PARKING (STALLS 15' X 20')	
TOTAL			236	



Source: W Design & Architects, April 2025



FUNDAMENTALS OF SOUND AND ENVIRONMENTAL NOISE

Sound is mechanical energy transmitted by pressure waves in a compressible medium such as air and is characterized by both its amplitude and frequency (or pitch). The human ear does not hear all frequencies equally. In particular, the ear deemphasizes low and very high frequencies. To better approximate the sensitivity of human hearing, the A-weighted decibel scale (dBA) has been developed. Decibels are based on the logarithmic scale. The logarithmic scale compresses the wide range in sound pressure levels to a more usable range of numbers in a manner like the Richter scale used to measure earthquakes. In terms of human response to noise, a sound 10 dBA higher than another is perceived to be twice as loud and 20 dBA higher is perceived to be four times as loud, and so forth. Everyday sounds normally range from 30 dBA (very quiet) to 100 dBA (very loud). On this scale, the human range of hearing extends from approximately 3 dBA to around 140 dBA.

Noise is generally defined as unwanted or excessive sound, which can vary in intensity by over one million times within the range of human hearing; therefore, a logarithmic scale, known as the decibel scale (dB), is used to quantify sound intensity. Noise can be generated by several sources, including mobile sources such as automobiles, trucks, and airplanes, and stationary sources such as construction sites, machinery, and industrial operations. Noise generated by mobile sources typically attenuates (is reduced) at a rate between 3 dBA and 4.5 dBA per doubling of distance. The rate depends on the ground surface and the number or type of objects between the noise source and the receiver. Hard and flat surfaces, such as concrete or asphalt, have an attenuation rate of 3 dBA per doubling of distance. Soft surfaces, such as uneven or vegetated terrain, have an attenuation rate of about 4.5 dBA per doubling of distance. Noise generated by stationary sources typically attenuates at a rate between 6 dBA and about 7.5 dBA per doubling of distance.

There are several metrics used to characterize community noise exposure, which fluctuate constantly over time. One such metric, the equivalent sound level (L_{eq}), represents a constant sound that, over the specified period, has the same sound energy as the time-varying sound. This is commonly used to describe the “average” noise levels within the environment. Noise exposure over a longer period is often evaluated based on the Day-Night Sound Level (L_{dn}). This is a measure of 24-hour noise levels that incorporates a 10-dBA penalty (or an additional 10 dBA) for sounds occurring between 10:00 p.m. and 7:00 a.m. when sounds seem to be louder. The penalty is intended to reflect the increased human sensitivity to noises occurring during nighttime hours, particularly at times when people are sleeping and there are lower ambient (background) noise conditions. Typical L_{dn} noise levels for light- and medium-density residential areas range from 55 dBA to 65 dBA. Similarly, Community Noise Equivalent Level (CNEL) is a measure of 24-hour noise levels, not an actual sound level heard at any time, that incorporates a 5-dBA penalty for sounds occurring between 7:00 p.m. and 10:00 p.m. and a 10-dBA penalty for sounds occurring between 10:00 p.m. and 7:00 a.m. to account for noise sensitivity in the evening and nighttime, respectively.¹

FUNDAMENTALS OF ENVIRONMENTAL GROUNDBORNE VIBRATION

Ground vibration consists of oscillatory (i.e., rapidly fluctuating) motions or waves with an average motion of zero (i.e., no net movement of the vibration element). Sources of earth-borne vibrations include natural phenomena (earthquakes, volcanic eruptions, sea waves, landslides, etc.) or man-made causes (explosions, machinery, traffic, trains, construction equipment, etc.). Vibration sources may be continuous (e.g., factory machinery) or transient (e.g., explosions).

¹ Federal Transit Administration, *Transit Noise and Vibration Impact Assessment Manual*, September 2018.

Several different methods are typically used to quantify vibration amplitude. One is the peak particle velocity (PPV); another is the root mean square (RMS) velocity. The PPV is defined as the maximum instantaneous positive or negative peak of the vibration wave. The RMS velocity is defined as the average of the squared amplitude of the signal. Vibration decibels (VdB) is commonly used to measure the RMS vibration velocity level. The PPV and RMS vibration velocity amplitudes are used to evaluate human response to vibration.

Table 1, Human Reaction and Damage to Buildings for Continuous or Frequent Intermittent Vibration Levels, displays the reactions of people and the effects on buildings produced by continuous vibration levels. The annoyance levels shown in the table should be interpreted with care since vibration may be found to be annoying at much lower levels than those listed, depending on the level of activity or the sensitivity of the individual. To sensitive individuals, vibrations approaching the threshold of perception can be annoying. Low-level vibrations frequently cause irritating secondary vibration, such as a slight rattling of windows, doors, or stacked dishes. The rattling sound can give rise to exaggerated vibration complaints, even though there is very little risk of actual structural damage.

Table 1
Human Reaction and Damage to Buildings for Continuous or Frequent Intermittent Vibration Levels

Peak Particle Velocity (inches/second)	Approximate Vibration Velocity Level (VdB)	Human Reaction	Effect on Buildings
0.006–0.019	64–74	Range of threshold of perception.	Vibrations unlikely to cause damage of any type.
0.08	87	Vibrations readily perceptible.	Recommended upper level to which ruins and ancient monuments should be subjected.
0.1	92	Level at which continuous vibrations may begin to annoy people, particularly those involved in vibration sensitive activities.	Virtually no risk of architectural damage to normal buildings.
0.2	94	Vibrations may begin to annoy people in buildings.	Threshold at which there is a risk of architectural damage to normal dwellings.
0.4–0.6	98–104	Vibrations considered unpleasant by people subjected to continuous vibrations and unacceptable to some people walking on bridges.	Architectural damage and possibly minor structural damage.

Source: California Department of Transportation, *Transportation Related Earthborne Vibrations*, 2002.

Ground vibration can be a concern in instances where buildings shake, and substantial rumblings occur. However, it is unusual for vibration from typical urban sources such as buses and heavy trucks to be perceptible. Common sources for groundborne vibration are planes, trains, and construction activities such as pile driving and vibratory compacting activities which require the use of heavy-duty earth moving equipment. For the purposes of this analysis, a PPV descriptor with units of inches per second (inch/second) is used to evaluate construction-generated vibration for building damage and human complaints.

EXISTING SETTING

Noise Sensitive Receptors

Noise-sensitive land uses are generally considered to include those uses where noise exposure could result in health-related risks to individuals, as well as places where quiet is an essential element of their intended purpose. Potentially sensitive land uses in the City include residences (including residences for the elderly), schools, churches, and libraries.

The nearest sensitive receptors to the project site are the existing church (Gateway Church of Brawley) located to the west across Brawley Avenue/Highway 86, approximately 130 feet away when measured from the property line. It should be noted that a residential community comprised of single-family residences is currently being constructed approximately 75 feet northeast of the project site when measured from the property line. While these single-family residences have not been fully constructed, the residences are most likely to be constructed and occupied prior to the construction completion of the proposed project. As such, they are analyzed as the closest sensitive receptors as a conservative analysis.

Stationary Sources

The project site is in a suburban area with the surrounding land uses consisting of commercial, agricultural, institutional, and residential uses. The primary sources of stationary noise in the project vicinity are urban-related activities (i.e., mechanical equipment). The noise associated with these sources may represent a single-event noise occurrence, short-term, or long-term/continuous noise.

Mobile Sources

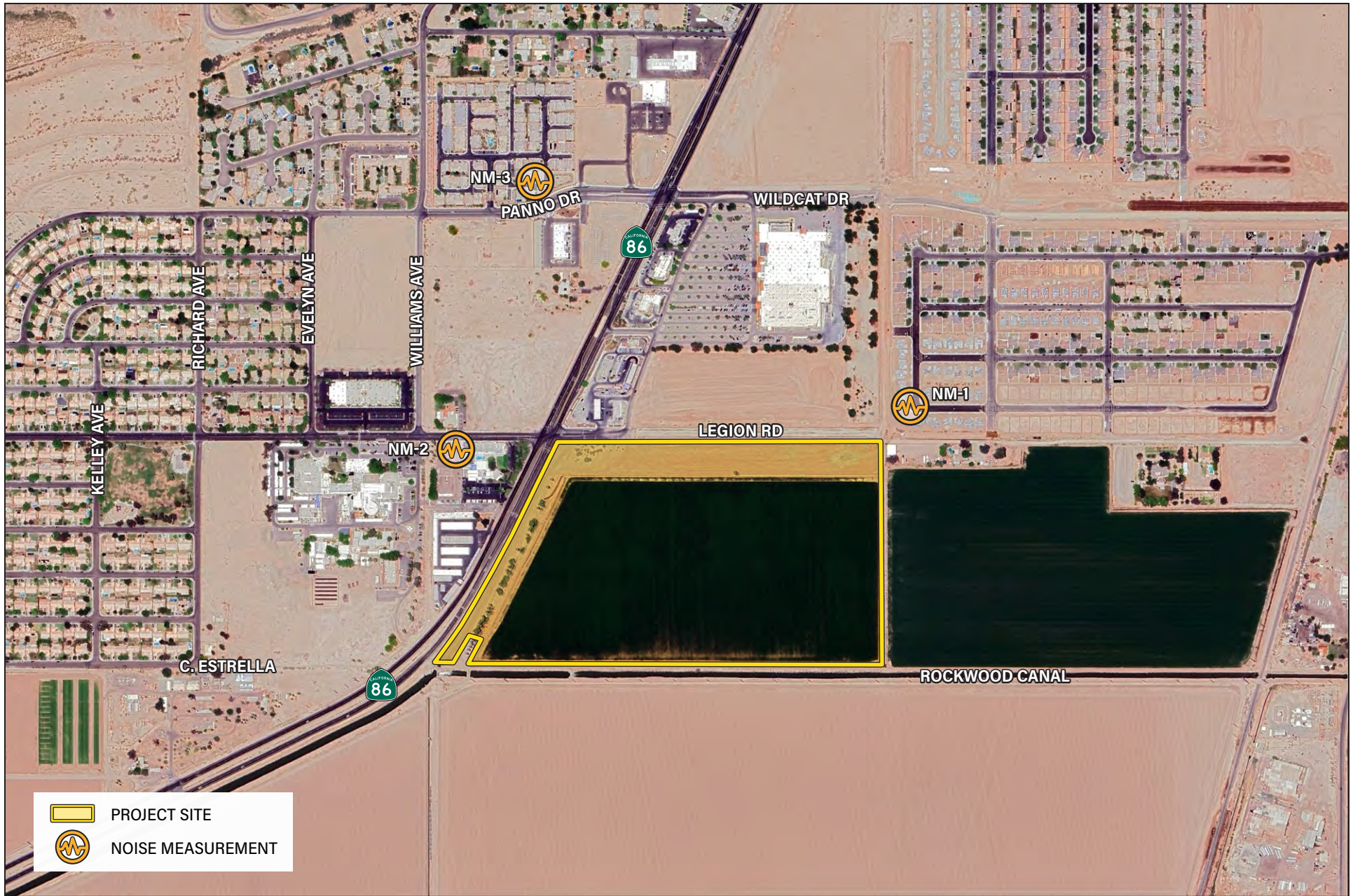
Most of the existing noise in the project area is generated from traffic along surrounding roadways including Highway 86 and West Legion Road.

Existing Ambient Noise Levels

To quantify existing ambient noise levels in the project area, Michael Baker International conducted three short-term noise measurements in the project vicinity on September 12, 2024. Exhibit 4, Noise Measurement Locations, displays the locations where these noise measurements were conducted. The noise measurement locations are representative of typical existing noise exposure at the nearest sensitive receptors. The 10-minute measurements were taken between 12:00 p.m. and 1:00 p.m.

Short-term (L_{eq}) measurements are considered representative of the noise levels throughout the day. The noise measurements were taken during “off-peak” (9:00 a.m. through 3:00 p.m.) traffic noise hours as this provides a more conservative baseline. During rush hour traffic, vehicle speeds and heavy truck volumes are often low. Free-flowing traffic conditions just before or after rush hour often yield higher noise levels.² The noise levels measured are identified in Table 2, Short-Term Noise Measurements.

² California Department of Transportation, *Technical Noise Supplement to the Traffic Noise Analysis Protocol*, September 2013.



Source: Google Earth Pro, October 2024

Table 2
Short-Term Noise Measurements

Site No.	Location	L _{eq} (dBA)	L _{min} (dBA)	L _{max} (dBA)	Start Time
NM-1	In front of 102 Riata Street	49.3	40.9	70.8	12:10 p.m.
NM-2	Southwest corner of the West Legion Road and Williams Avenue intersection	62.2	45.9	78.6	12:31 p.m.
NM-3	Approximately 600 feet west of the Highway 86 and Panno Drive intersection	60.0	39.6	75.3	12:47 p.m.
Notes: dBA = A-weighted decibels; L _{eq} = Average Sound Level; L _{min} = Lowest time-weighted sound level measured; L _{max} = Highest time-weighted sound level measured					
Refer to Appendix A, <i>Noise Data</i> , for the results of the field measurements.					

Further description of each noise measurement location is discussed below:

- Noise Measurement Location 1 (NM-1): NM-1 was located in front of a future single-family residence at 102 Riata Street. This noise measurement location collects data of the ambient noise levels at this receptor, which is the nearest sensitive receptor to the project site. It should be noted that this location is within a residential community comprised of single-family residences that is currently being constructed. As of September 12, 2024, 102 Riata Street has not been constructed but a foundation pad for a future single-family residence is present.
- Noise Measurement Location 2 (NM-2): NM-2 was located at the southwest corner of West Legion Road and Williams Avenue intersection. It should be noted that NM-2 is representative of multiple nearby sensitive land uses, including the Gateway Church of Brawley, Pioneers Memorial Hospital, Pioneers Memorial Wound Care, etc.
- Noise Measurement Location 3 (NM-3): NM-3 was located approximately 600 feet west of the Highway 86 and Panno Drive intersection, near multi-family residences at 321 Panno Drive. This noise measurement location collects data of the ambient noise levels at this receptor, which is the next closest residential receptor to the proposed project.

Meteorological conditions were clear, hot temperatures (98 degrees Fahrenheit [°F]), and wind speeds of approximately 5 miles per hour. As shown in [Table 2](#), noise levels in the project vicinity range from 49.3 to 62.2 dBA L_{eq}. Major noise sources during the measurements include vehicular movements along unpaved roads directly south and west of the project site and along the perimeter of the farmland bordering the site, West Legion Road, or Panno Drive. Noise monitoring equipment used for the short-term noise survey consisted of a Brüel & Kjær Hand-held Analyzer Type 2250 equipped with a Type 4189 pre-polarized microphone. The monitoring equipment complies with applicable requirements of the American National Standards Institute (ANSI) for Type I (precision) sound level meters. Refer to [Appendix A, Noise Data](#), for the results of the field measurements.

REGULATORY SETTING

State

State Office of Planning and Research

The State Office of Planning and Research's (OPR) *Noise Element Guidelines* include recommended exterior and interior noise level standards for local jurisdictions to identify and prevent the creation of incompatible land uses due to noise. The *Noise Element Guidelines* contain a land use compatibility table that describes the compatibility of various land uses with a range of environmental noise levels in terms of the CNEL. The guidelines also present adjustment factors that may be used to arrive at noise acceptability standards that reflect the noise control goals of the community, the particular community's sensitivity to noise, and the community's assessment of the relative importance of noise pollution.

Local

City of Brawley

City of Brawley General Plan 2030

The *City of Brawley General Plan 2030* (General Plan) was adopted in September 2008. The *Public Safety and Noise Element* is a comprehensive program to limit the exposure of the community to excessive noise levels. Noise sensitive receptors identified by the City include residential uses, schools, and hospitals. The City identifies noise-sensitive land uses and noise sources (i.e., transportation, construction, and stationary) with the intent of separating these uses. The following goals and policies are applicable to the project:

Public Safety and Noise Element

PSNE Goal 7: Protect People Living and Working in the City from Excessive Transportation Noise

PSNE Policy 7.2.3: Require developers to construct noise abatements that meet Caltrans's acoustical criteria if new developments cause increases in traffic volumes that result in roadway noise levels greater than 65 dB CNEL at existing dwellings.

PSNE Goal 8: Protect People Living and Working in the City from Excessive Non-Transportation Noise

PSNE Policy 8.1.2: Minimize the impacts of non-transportation construction noise on adjacent land uses through limiting the permitted hours of activity.

PSNE Goal 9: Incorporate Noise Considerations into Land Use Planning Decisions

PSNE Policy 9.1.6: Require commercial uses from a mixed-use project (including residential) to comply with the Noise Ordinance. Design mixed-use structures to prevent transfer of noise from the commercial to the residential use.

PSNE Policy 9.1.7: Require new commercial/industrial operations located in proximity to existing or proposed residential areas to incorporate noise mitigation into project design, to comply with Noise Ordinance.

The General Plan also includes noise standards for various land use categories in the City as show in Table 3, City of Brawley Interior and Exterior Noise Standard.

Table 3
City of Brawley Interior and Exterior Noise Standard

Land Use Category	Noise Standard ¹	
	Interior ^{2,3}	Exterior
Residential - Single family, multi-family, duplex, mobile home	CNEL 45 dB	CNEL 65 dB ⁴
Residential - Transient lodging, hotels, motels, nursing homes, hospitals	CNEL 45 dB	CNEL 65 dB ⁴
Private offices, church sanctuaries, libraries, board rooms, conference rooms, theaters, auditoriums, concert halls, meeting halls, etc.	L _{eq} (12) 45 dBA	-
Schools	L _{eq} (12) 45 dBA	L _{eq} (12) 67 dBA
General offices, reception, clerical, etc.	L _{eq} (12) 50 dBA	-
Bank lobby, retail store, restaurant, typing pool, etc.	L _{eq} (12) 55 dBA	-
Manufacturing, kitchen, warehousing, etc.	L _{eq} (12) 65 dBA	-
Parks, playgrounds, etc.	-	CNEL 65 dB ⁵
Golf courses, outdoor spectator sports, amusement parks, etc.	-	CNEL 70 dB ⁵
Notes: CNEL = community noise equivalent level; NA = not applicable 1. L _{eq} (12): The A-weighted equivalent sound level averaged over a 12-hour period (usually the hours of operation). 2. Noise standard with windows closed. 3. Indoor environment excluding bathrooms, toilets, closets and corridors. 4. Outdoor environment limited to rear yard of single-family homes, multifamily patios and balconies. 5. Outdoor environment limited to playground areas, picnic areas, and other areas of frequent human use.		
Sources: City of Brawley, <i>City of Brawley General Plan 2030, Table PSNE-3</i> , September 2008.		

City of Brawley Noise Ordinance

The Noise Ordinance, *Chapter 18, Noise*, Sections 18.1 through 18.5, contain the City’s noise regulations. It should be noted that the adopted Noise Ordinance does not include noise standards or numerical thresholds for noise sources within the City. As of March 2024, the City of Brawley City Council has reviewed and discussed the second reading draft ordinance designed to address noise concerns within the City’s limit.³ While this draft Noise Ordinance has not been formally adopted, applicable contents of the draft Noise Ordinance have been used to analyze the proposed project. It should be noted that the draft Noise Ordinance contains more stringent regulations on noise than what is currently adopted. Specifically, the draft Noise Ordinance would amend the currently adopted Noise Ordinance to include Sections 18.1 through 18.25. These sections would address a wide range of noise concerns (construction noise, motor vehicles, signal alarms, noise thresholds, and general noise regulations). The draft Noise Ordinance sections that would be applicable to the proposed project are discussed below:

Section 18.4, *Sound Level Limits*, of the draft Noise Ordinance contains new exterior noise thresholds for residential uses. Table 4, Exterior Noise Limits, displays the noise thresholds for single-family residential and residential medium density zones. It should be noted that the exterior noise limits do not apply to construction noise.

³ City of Brawley, *Brawley City Council & Successor Agency to Brawley Community Redevelopment Agency Regular Meeting Agenda March 19, 2024 at 6:00 p.m.*, <https://www.brawley-ca.gov/assets/meetings/03192024-agenda-march-19,-2024.pdf>, accessed April 10, 2025.

Table 4
Exterior Noise Limits

Zone	Time of Day	One-Hour Average Sound Level, dB
Single Family Residential Zones	7:00 a.m. to 10:00 p.m.	45
	10:00 p.m. to 7:00 a.m.	40
Residential Medium Density Zone	7:00 a.m. to 10:00 p.m.	50
	10:00 p.m. to 7:00 a.m.	40
Sources: City of Brawley, <i>Brawley City Council & Successor Agency to Brawley Community Redevelopment Agency Regular Meeting Agenda March 19, 2024</i> , at 6:00 p.m., https://www.brawley-ca.gov/assets/meetings/03192024-agenda-march-19,-2024.pdf , accessed September 17, 2024.		

Section 18.7, *Construction Equipment*, of the draft Noise Ordinance contains noise regulations governing the use of construction equipment. No person shall operate construction equipment at any construction site on Sundays and on days appointed by the president, governor, or the City Council for a public holiday. A person may only operate construction equipment at construction sites on days not listed above between the hours of 6:00 a.m. and 7:00 p.m. on Monday through Saturday. Additionally, no equipment shall be operated in a manner that would result in noise in excess of 75 dBA when measured at any bordering residential properties.

Section 18.10, *General Noise Regulations*, of the draft Noise Ordinance contains general noise regulations governing a multitude of noise sources (i.e., horns, radios, musical instruments, etc.). For heating, ventilation, and air conditioning (HVAC) units, a noise violation would occur if these stationary sources would result in a five dBA increase over the ambient noise levels at sensitive receptors.

CALIFORNIA ENVIRONMENTAL QUALITY ACT THRESHOLDS

The environmental analysis in this memorandum is patterned after the Initial Study Checklist recommended by the *CEQA Guidelines*. The issues presented in the Initial Study Checklist have been utilized as thresholds of significance in this section. Accordingly, a project may have a significant adverse impact related to noise and vibration if it would result in any of the following:

- Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies (refer to Impact Statement NOI-1);
- Generation of excessive groundborne vibration or groundborne noise levels (refer to Impact Statement NOI-2); and/or
- For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels (refer to Impact Statement NOI-3).

METHODOLOGY AND THRESHOLDS OF SIGNIFICANCE

Methodology

Noise levels from construction equipment and activities were modeled using the Federal Highway Administration's Roadway Construction Noise Model (RCNM); refer to [Appendix A](#) for results of the RCNM modeling. Project construction equipment is based on the *Brawley Mixed Use Master Plan Project - Air Quality Assessment* prepared by Michael Baker International, dated April 2025. As the proposed project contains a mix of land uses including residential and commercial uses, operational noise from the development would be comprised of operational mobile noise, stationary equipment noise (heating, air conditioning, etc.), crowd noise from gatherings of large numbers of people (e.g., neighborhood events, other social gatherings, etc.), and semi-truck noise (loading docks, vehicular movement, and back-up alarms). Operational noise sources are based on reference data contained in noise databases and calculated to determine noise levels at nearby sensitive receptors; refer to [Appendix A](#) for the calculation formula.

Thresholds of Significance

Construction Noise

As discussed above, the City of Brawley does not have a formally adopted numerical threshold for construction noise impacts. However, the draft Noise Ordinance contains a numerical threshold of 75 dBA when measured at a receptor's property line. While the draft Noise Ordinance has not been formally adopted by the City of Brawley, the following discussion utilizes the 75 dBA threshold as a conservative analysis. Additionally, the current Noise Ordinance does not contain permitted hours of construction. However, the draft Noise Ordinance allows the use of construction equipment at construction sites between the hours of 6:00 a.m. to 7:00 p.m. during weekdays and Saturdays, not including Sunday and recognized holidays. As such, a significant impact would result if construction would occur outside the hours of 6:00 a.m. to 7:00 p.m. during weekdays and Saturdays and/or exceed the numerical threshold of 75 dBA when measured at a receptor's (i.e., schools, residential uses, church, etc.) property line.

Operational Noise

The General Plan contains exterior noise standards by land use; refer to [Table 3](#). However, the draft Noise Ordinance contains more stringent regulations and thresholds than what was listed in the General Plan for residential land uses, refer to [Table 4](#). While the draft Noise Ordinance has not been formally adopted by the City of Brawley, the following discussion utilizes the more stringent requirements contained in the draft Noise Ordinance. As discussed above, the closest sensitive receptors are the Gateway Church of Brawley located west of the project site and the future residential community comprised of single-family residential buildings to be located to the northeast. Currently, the draft Noise Ordinance does not contain any numerical threshold for churches. The future single-family residences planned to the northeast of the project site would be located closer to operational noise from the proposed project than the church. Thus, as a conservative analysis, operational noise has been analyzed at the future single-family residences. Pursuant to Section 18.4 of the draft Noise Ordinance, a significant impact would occur at the (future) adjacent single-family residential uses if exterior noise levels exceed 45 dB between the hours of 7:00 a.m. to 10 p.m. or 40 dB between the hours of 10:00 p.m. and 7:00 a.m.

According to the draft Noise Ordinance, it is unlawful for mechanical equipment (HVAC units) to increase ambient noise levels at the property line by 5 dBA or more. However, the draft Noise Ordinance does not have a threshold of significance for other noise sources (crowd noise). As a conservative analysis, operational noise sources were analyzed utilizing the numerical threshold shown in [Table 4](#). As such, a significant increase in noise levels would occur if HVAC units from the project would increase the ambient noise levels by 5 dBA and/or if other operational noise sources would exceed the numerical thresholds shown in [Table 4](#) at the property line.

Vibration

The California Department of Transportation's (Caltrans) *Transportation and Construction Vibration Manual* identifies various vibration damage criteria for different building classes. This evaluation uses the Caltrans architectural damage criterion for continuous vibrations at residential buildings of 0.3 inch-per-second (inch/second) PPV and commercial buildings of 0.5 inch/second PPV. The types of construction vibration impacts include human annoyance and building damage. As such, a significant impact would occur if vibration from project construction and/or operation would exceed 0.3 inch/second PPV at the sensitive receptors (future single-family residential buildings) to the northeast.

IMPACT ANALYSIS

NOI-1 Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

Level of Significance: Less Than Significant Impact.

Construction Noise Impacts

Ground-borne noise and other types of construction-related noise impacts typically occur during the initial grading phase, which has the potential to create the highest levels of noise. Construction equipment produces maximum noise levels when equipment is operating under full power conditions (i.e., the equipment engine at maximum speed). However, equipment used on construction sites typically operates under less than full power conditions, or part power. To characterize construction-period noise levels more accurately, the average (L_{eq}) noise level associated with each construction stage is calculated based on the quantity, type, and usage factors for each type of equipment that would be used during each construction stage. These noise levels are typically associated with multiple pieces of equipment simultaneously operating on part power.

The estimated construction noise levels at the nearest noise-sensitive receptors are presented in [Table 5, *Construction Noise Levels at the Nearest Receptors*](#). Noise levels from construction equipment and activities were modeled using the Federal Highway Administration's RCNM. To present a conservative impact analysis, the estimated noise levels were calculated for a scenario in which all heavy construction equipment was assumed to operate simultaneously.

Table 5
Construction Noise Levels at the Nearest Receptors

Phase	Estimated Exterior Construction Noise Level at 1,205 feet (Center of the Site to Property Line of Gateway Church of Brawley to the West) (dBA L _{eq}) ¹	Estimated Exterior Construction Noise Level at 1,405 feet (Center of the Site to Property Line of Future Residential Uses to the Northeast) (dBA L _{eq}) ¹
Grading	60.6	59.2
Building Construction	57.3	58.6
Paving	54.0	52.7
Architectural Coating	46.1	44.7
Notes:		
1. Modeled noise levels conservatively assume the simultaneous operation of all heavy construction equipment at the same precise location. Modeled heavy construction equipment includes excavator, grader, rubber tired dozer, scrapers, and tractors during the grading phase; crane, forklifts, generator, tractors, and welders during the building construction phase; pavers, paving equipment and rollers during the paving phase; and air compressors during the architectural coating phase.		
Source: Federal Highway Administration, <i>Roadway Construction Noise Model (RCNM)</i> , 2006 (see Appendix A).		

The nearest existing sensitive use (Gateway Church of Brawley) is located to the west of the project site, approximately 130 feet away when measured at the property line. Additionally, a residential community comprised of single-family residences is currently being constructed approximately 75 feet to the northeast of the property line. While these single-family residences have not been fully constructed, the residences are anticipated to be constructed and occupied prior to construction completion of the proposed project. As a conservative analysis, the following analyzes the project's construction noise impacts on existing and future sensitive receptors.

Construction activities would occur throughout the project site, and it should also be noted that construction noise levels would intermittently occur for a few days when construction equipment is operating closest to the nearest sensitive uses. The remainder of the time, the construction noise levels would be much lower because the equipment would be working in an area farther away from the existing sensitive uses. The General Noise Assessment methodology prescribed in the FTA *Transit Noise and Vibration Impact Assessment Manual* recommends evaluating construction noise from the center of the site, stating under the variable distance in its construction noise calculation to "assume that all equipment operates at the center of the project." As such, the construction noise levels shown in [Table 5](#) are estimated using the distance from the center of the project site to the property line of the existing sensitive receptors, which is approximately 1,205 feet from the Gateway Church of Brawley and 1,405 feet from the future residences to the northeast.

It should be noted that modeling of construction noise levels in [Table 5](#) assumes that construction equipment would operate simultaneously and represents a worse-case scenario. As shown in [Table 5](#), construction-generated noise levels would range from 46.1 dBA L_{eq} to 60.6 dBA L_{eq} at the nearest existing sensitive receptor (Gateway Church of Brawley) property boundary. Additionally, as shown in [Table 5](#), construction-generated noise levels would range from 44.7 dBA L_{eq} to 59.2 dBA L_{eq} at the nearest future sensitive receptors (residential community) property boundary. According to the draft Noise Ordinance Section 18.7, a significant impact would occur if construction equipment exceeded a maximum noise level of 75 dBA when measured at a receptor's property line. As shown in [Table 5](#), noise levels during each phase would not have the potential to exceed the applicable noise threshold; impacts would be less than significant.

According to the draft Noise Ordinance Section 18.7, construction would only be permitted between the hours of 6:00 a.m. and 7:00 p.m. on weekdays and Saturdays, and construction shall not occur on Sunday or a public holiday. As such, noise generated from project construction activities would only occur during the hours of 6:00 a.m. and 7:00 p.m. on weekdays and Saturdays and would not occur on a Sunday or public holiday. However, it should be noted that the draft Noise Ordinance has not been formally adopted and as such, the permitted hours of construction may be subject to change. Nevertheless, the proposed project would be required to comply with the hours of construction to be formally adopted in the Noise Ordinance. As such, construction noise impacts would be less than significant upon compliance with applicable hours of construction.

Construction Trips Noise Impacts

Construction activities would also cause increased noise along access routes along Highway 86 and West Legion Road due to movement of equipment and workers, as well as haul trips. According to Caltrans, a doubling of traffic (100 percent increase) on a roadway would result in a perceptible increase in traffic noise levels (3 dBA).⁴ As such, a significant impact would occur if construction-related trips double existing traffic volumes.

It is anticipated that project construction would generate a maximum of 24 hauling trips per day, 444 worker trips per day, and 114 vendor trips per day. Based on the City's General Plan, Highway 86 to the southern City limit has a projected 2025 Average Daily Trips (ADT) of 30,700.⁵ The combined total of project-related construction trips (582 trips) would not result in a doubling of existing traffic volumes along Highway 86. Construction-related trips (vendor, work, and hauling trips) would primarily travel along Highway 86; therefore, the project's construction-related trips have been compared to traffic volumes along Highway 86. As construction-related trips would not double existing traffic volumes along Highway 86, there would not be a perceptible increase (3 dBA) in traffic noise. Additionally, mobile traffic noise from construction trips would be temporary and would cease upon project completion. Impacts in this regard would be less than significant.

Long-Term Operational Noise Impacts

Off-Site Mobile Noise

Future development resulting with implementation of the proposed project would result in some additional traffic on adjacent roadways, thereby potentially increasing vehicular noise in the vicinity of existing and proposed land uses. The most prominent source of mobile traffic noise in the project vicinity is along Highway 86 and West Legion Road.

According to the project's transportation analysis (Michael Baker 2025), the project would generate approximately 14,307 ADT based on the proposed land use types. For the purpose of this analysis, the 14,307 ADT from the proposed project has been compared to existing traffic volumes. According to Caltrans, a doubling of traffic (100 percent increase) on a roadway would result in a perceptible increase in traffic noise levels (3 dBA). Based on the City's General Plan, Highway 86 to the southern City limit has a projected 2025 Average Daily Trips (ADT) of 30,700.⁶ As such, the project's 14,307 ADT would not double

⁴ California Department of Transportation, *Technical Noise Supplement to the Traffic Noise Analysis Protocol*, September 2013.

⁵ City of Brawley, *City of Brawley Final General Plan 2030, Table PSNE-4*, September 2008.

⁶ City of Brawley, *City of Brawley Final General Plan 2030, Table PSNE-4*, September 2008.

existing traffic volumes along Highway 86. While there is traffic along West Legion Road, it should be noted that there is no traffic count study conducted along West Legion Road to quantify existing traffic volumes. It should be noted that the existing West Legion Road east of Highway 86 is currently only used to access the ARCO gas station.

As part of the project, the proposed development would extend West Legion Road to serve the project site; refer to [Exhibit 3](#). As such, project operation would utilize the newly extended West Legion Road. It should be noted that no existing sensitive receptors are located along the existing (or planned future extension of West Legion Road) east of Highway 86. Similarly, the proposed project would include two new roads that would be utilized as secondary access points to the project site. Specifically, a new road would run along the eastern boundary of the project site and a new road would run along the southern boundary of the project site; refer to [Exhibit 3](#). However, similar to the extension of West Legion Road, construction of these two new roads would not be located near existing sensitive receptors. Additionally, the proposed project would have various primary and secondary access points, which would ensure that the 14,307 daily trips generated from the project would be distributed amongst multiple roadways and not concentrated along a single roadway. As such, traffic noise would not be a concern as there are no sensitive receptors that would be exposed to project-generated traffic noise. Additionally, some project-generated trips would come from West Legion Road west of Highway 86. However, project trip distribution along West Legion Road west of Highway 86 would be low, and therefore is not expected to double existing traffic volumes. As such, a less than significant impact would occur in this regard.

Stationary Noise

Stationary noise sources associated with the project would include the operation of mechanical equipment, delivery trucks (slow-moving trucks and back-up alarms), and outdoor gathering areas.

Mechanical Equipment Noise

HVAC units would be installed on the roof or on the side of the proposed buildings associated with the proposed Master Plan. Typically, mechanical equipment noise is approximately 66 dBA at 3 feet from the source.⁷ Based upon the Inverse Square Law, sound levels decrease by 6 dBA for each doubling of distance from the source.⁸ The closest HVAC units to nearby sensitive receptors would be the units on top of the most northeastern building, located approximately 250 feet from the future single-family residential buildings to the northeast. At this distance, noise levels from a single HVAC unit would be approximately 28 dBA at the nearest sensitive receptor. Based on [Exhibit 3](#), the closest building to the sensitive receptors to the northeast would be comprised of 12 dwelling units. This analysis assumes approximately 12 HVAC units (one HVAC unit for each dwelling unit) would be present, which would generate a combined noise level of approximately 39 dBA at 250 feet when operating simultaneously. Thus, mechanical equipment from the proposed project would not increase noise levels by more than 5 dBA (pursuant of Section 18.10 of the draft Noise Ordinance) over the existing ambient noise levels of 49.3 dBA at the future sensitive receptors to the northeast; refer to [Table 2](#). Additionally, mechanical equipment noise from the proposed project (approximately 39 dBA) would not exceed the applicable numerical threshold of 45 dBA for daytime and 40 dBA for nighttime (refer to [Table 4](#)). Impacts would be less than significant in this regard.

⁷ Elliott H. Berger, Rick Neitzel, and Cynthia A. Kladden, *Noise Navigator Sound Level Database with Over 1700 Measurement Values*, June 26, 2015.

⁸ Cyril M. Harris, *Noise Control in Buildings*, 1994.

Outdoor Gathering Area Noise

The project would include two parks and an open-air courtyard with amenities (i.e., dog park, pool, fire pit, etc.) located centrally on the residential portion of the project site. The closest outdoor gathering area with the potential to generate crowd noise is the open-air courtyard located as close as 650 feet from the (future) residential receptors to the northeast. The courtyard has the potential to be accessed by groups of people intermittently for various occasions. Noise generated by groups of people (i.e., crowds) is dependent on several factors including vocal effort, impulsiveness, and the random orientation of the crowd members. Crowd noise is estimated at 60 dBA at one meter (3.28 feet) away for raised normal speaking.⁹ This noise level would have a +5 dBA adjustment for the impulsiveness of the noise source, and a -3 dBA adjustment for the random orientation of the crowd members.¹⁰ Therefore, crowd noise would be approximately 62 dBA at one meter from the source (i.e., open-air courtyard).

At approximately 650 feet, crowd noise levels generated by the proposed project would be approximately 16 dBA at the property line. It should be noted that the proposed residential buildings onsite would block the line-of-sight from the parks located centrally on the residential portion of the project site and would help further reduce noise levels. As such, crowd noise from the two parks and open-air courtyard would be lower than 16 dBA. Also, it should be noted that the proposed townhomes closest to the future residential community to the northeast would include backyards and patios which have the potential to generate crowd noise. The backyards and/or patios from the proposed townhomes would be located as close as 300 feet from the future sensitive receptor to the northeast. At this distance, crowd noise would be approximately 23 dBA.

Crowd noise from the proposed project would not exceed the applicable numerical threshold of 45 dBA for daytime and 40 dBA for nighttime (refer to [Table 4](#)). Additionally, crowd noise from the proposed project would be lower than the existing ambient noise levels of 49.3 dBA at the future sensitive receptors to the northeast; refer to [Table 2](#). Thus, noise from crowds gathering at the open-air courtyard would not be audible to the nearby sensitive receptors. Impacts would be less than significant.

Slow-Moving Trucks

On-site operations would also include noise from on-site truck movements and idling. Per information provided by the project Applicant, there would be an estimated 20 truck deliveries per week for the commercial component of the proposed project. Typically, slow movements from these trucks can generate a maximum noise level of approximately 79 dBA at 50 feet.¹¹ The nearest sensitive receptor to a commercial component of the proposed project is the Gateway Church of Brawley, located approximately 130 feet to the west of the boundary of Pad 4; refer to [Exhibit 3](#). The next closest sensitive receptor is the future residential community located approximately 75 feet to the northeast of the boundary of residential component of the proposed project; refer to [Exhibit 3](#). However, the future residential community is located as close as 800 feet from the closest proposed commercial use (Pad 12) where delivery trucks would be present. Based on the draft Noise Ordinance, there is no exterior noise standard for churches within the City. Similarly, based on the currently adopted exterior noise thresholds for the City, churches do not have an exterior noise threshold; refer to [Table 3](#). The following analysis

⁹ M.J. Hayne, et al, *Prediction of Crowd Noise*, Acoustics, November 2006.

¹⁰ Elliott H. Berger, Rick Neitzel, and Cynthia A. Kladden, *Noise Navigator Sound Level Database with Over 1700 Measurement Values*, June 26, 2015.

¹¹ Ibid.

therefore only analyzes the potential impact of truck noise on the future sensitive receptors (residences) to the northeast.

The closest commercial component to the residential receptors to the northeast is Pad 11, which is planned to support larger retail shopping center uses and is located approximately 800 feet away. As previously discussed, there is no current or proposed exterior noise standard for churches within the City. As such, only potential impact of commercial truck noise on the future sensitive receptors (single-family residences) to the northeast was analyzed. It should be noted that deliveries from semi-trucks servicing commercial uses are anticipated to occur during the late evening or nighttime hours. At approximately 800 feet, noise levels from slow-moving trucks would be approximately 55 dBA. However, the buildings within the residential component of the proposed project would block the line-of-sight between the truck-movement area and the closest sensitive receptors, which would provide a minimum attenuation of 15 dBA.¹² As such, noise from slow-moving trucks would be reduced to 40 dBA and would not exceed the nighttime noise standard of 40 dBA for single-family residential zones (pursuant of Section 18.10 of the draft Noise Ordinance); refer to [Table 3](#). Further, slow-moving truck activity noise currently exists in the project vicinity from the Walmart Supercenter to the north and project operations would therefore not represent a new source of noise. Additionally, noise from slow-moving trucks onsite would be lower than the existing ambient noise levels of 49.3 dBA at the future residential sensitive receptors to the northeast; refer to [Table 2](#). Impacts would be less than significant in this regard.

Back-Up Alarms

It is anticipated that loading docks would be provided with the commercial component of the proposed project to support operations. Medium- and heavy-duty trucks reversing into truck loading docks and parking stalls would produce noise from back-up alarms (also known as back-up beepers). Back-up beepers produce a typical volume of 97 dBA at one meter (i.e., 3.28 feet) from the source.¹³ The nearest sensitive receptor to a commercial component of the proposed project is the Gateway Church of Brawley, located approximately 130 feet west of Pad 4; refer to [Exhibit 3](#). The next closest sensitive receptor is the future residential community located approximately 800 feet to the northeast of the boundary of Pad 11, the closest commercial use; refer to [Exhibit 3](#). As shown in [Exhibit 3](#), it is anticipated that loading docks associated with the commercial development on Pad 11 would be located along the western portion of the building. As a conservative analysis, the following evaluation analyzes noise impacts at the site boundary. As discussed above, the City does not have an exterior noise standard for churches in the adopted or draft Noise Ordinance. As such, the following analysis only analyzes the impact of back-up alarms to the future sensitive receptors (residential) to the northeast.

At approximately 800 feet, noise levels from back-up beepers would be approximately 49 dBA. It should be noted that noise from slow-moving trucks would be intermittent throughout the day and night and would not present a constant source of noise. The residential component of the proposed project would block the line-of-sight between the truck-movement area and the closest sensitive receptors, which would provide a minimum attenuation of 15 dBA.¹⁴ Therefore, noise levels from slow-moving trucks would be reduced to approximately 34 dBA at the nearest sensitive receptors. Noise from the back-up alarms would not exceed the draft Noise Ordinance's daytime exterior (45 dBA) and nighttime exterior (40 dBA) noise standards at the sensitive receptors; refer to [Table 3](#). Additionally, back-up alarm noise would be lower

¹² Federal Highway Administration, *Roadway Construction Noise Model User's Guide Appendix A*, January 2006.

¹³ Environmental Health Perspectives, *Vehicle Motion Alarms: Necessity, Noise Pollution, or Both?* <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3018517/>, accessed April 10, 2025.

¹⁴ Federal Highway Administration, *Roadway Construction Noise Model User's Guide Appendix A*, January 2006.

than the existing ambient noise levels of 49.3 dBA at the future sensitive receptors to the northeast; refer to [Table 2](#). Impacts would be less than significant in this regard.

Mitigation Measures: No mitigation is required.

NOI-2 Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?

Short-Term Construction Vibration Impacts

Level of Significance: Less Than Significant Impact.

Project construction can generate varying degrees of groundborne vibration, depending on the construction procedure and the construction equipment used. Operation of construction equipment generates vibrations that spread through the ground and diminish in amplitude with distance from the source. The effect on buildings located in the vicinity of the construction site often varies depending on soil type, ground strata, and construction characteristics of the receiver building(s). The results from vibration can range from no perceptible effects at the lowest vibration levels, to low rumbling sounds and perceptible vibration at moderate levels, to slight damage at the highest levels. Groundborne vibrations from construction activities rarely reach levels that damage structures.

The Caltrans *Transportation and Construction Vibration Manual* identifies various vibration damage criteria for different building classes. This evaluation uses the Caltrans architectural damage criterion for continuous vibrations at residential buildings of 0.3 inch-per-second (inch/second) PPV and commercial buildings of 0.5 inch/second PPV. The types of construction vibration impacts include human annoyance and building damage. Human annoyance is assessed based on levels of perception, with a PPV of 0.08 inch/second being considered “readily perceptible,” 0.1 inch/second being perceptible and may begin to annoy receptors, 0.2 inch/second being perceptible and may annoy people within buildings, and 0.4 to 0.6 inch/second as “unpleasant;” refer to [Table 1](#). Human annoyance occurs when construction vibration rises significantly above the threshold of human perception for extended periods of time. Construction of the proposed project would occur over approximately 33 months and would include grading, building construction, paving, and architectural coatings. Typical vibration produced by construction equipment is illustrated in [Table 6, *Typical Vibration Levels for Construction Equipment*](#).

Table 6
Typical Vibration Levels for Construction Equipment

Equipment	Approximate peak particle velocity at 25 feet (inch/second)	Approximate peak particle velocity at 225 feet (inch/second) ¹	Approximate peak particle velocity at 165 feet (inch/second) ¹
Large bulldozer	0.089	0.0033	0.0052
Loaded trucks	0.076	0.0028	0.0045
Small bulldozer	0.003	0.0001	0.0002
Notes: 1. Calculated using the following formula: $PPV_{equip} = PPV_{ref} \times (25/D)^{1.1}$ where: PPV_{equip} = the peak particle velocity in in/sec of the equipment adjusted for the distance PPV_{ref} = the reference vibration level in in/sec from Table 7-4 of the FTA <i>Transit Noise and Vibration Impact Assessment Guidelines</i> D = the distance from the equipment to the receiver			
Source: California Department of Transportation, <i>Transportation and Construction Vibration Guidance Manual</i> , April 2020.			

Vibration velocities from typical heavy construction equipment operation would range from 0.003 to 0.089 inch/second PPV at 25 feet from the source of activity. The nearest structure to the project site occupied by sensitive receptors is the existing Gateway Church of Brawley located approximately 225 feet to the west when measured from the project site property line to the sensitive receptor's building façade. Vibration level during operation of construction equipment would be approximately 0.0001 inch/second PPV to 0.0033 inch/second PPV at 225 feet; refer to [Table 6](#). Additionally, a residential community comprised of single-family residential homes is currently being constructed approximately 165 feet to the northeast when measured from the project site property line to the receptor's foundation pad. Vibration level during operation of project construction equipment would be approximately 0.0002 inch/second PPV to 0.0052 inch/second PPV at 165 feet; refer to [Table 6](#). As a result, construction groundborne vibration would not exceed the 0.3 inch/second PPV significance threshold for vibration to the nearest residential structures and 0.5 inch/second PPV significance threshold for vibration to the nearest commercial structure (Gateway Church of Brawley). Thus, a less than significant impact would occur in this regard.

As indicated in [Table 6](#), vibration velocities from heavy construction equipment operation would be below the 0.2 inch/second factor for human annoyance within buildings. As discussed above, 0.2 inch/second factor is the threshold in which receptors within buildings may begin to experience annoyance due to vibration velocities. It should also be noted that vibration velocities would only occur when construction equipment are operational closer to the sensitive receptors and would diminish as they move away. Additionally, construction equipment would only be operational for short periods of time, further limiting the overall vibration velocities felt by nearby sensitive receptors. Equipment would not be operational at peak vibration velocities for extended periods of time. Impacts would be less than significant in this regard.

Long-Term Operational Vibration Impacts

Level of Significance: No Impact.

The project would involve the future construction of various land uses including multi-family residential, commercial retail (strip retail plaza and shopping center), and hotel uses. These land uses are not generally associated with high levels of vibration. As such, the project would not generate substantial groundborne vibration during operation that would be felt by surrounding land uses. Additionally, the

project operation would not involve railroads or substantial heavy truck operations and therefore would not result in vibration impacts at surrounding uses. Thus, no impact would occur in this regard.

Mitigation Measures: No mitigation is required.

NOI-3 For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

Level of Significance: No Impact.

The nearest public use airport to the project site is the Brawley Municipal Airport which lies approximately 2.8 miles to the northeast of the project site. According to Exhibit 3a, *Brawley Municipal Airport Compatibility Map*, of the Brawley Municipal Airport Land Use Compatibility Map, the project site is not located within the airport CNEL contours.¹⁵ The project site is not in the vicinity of a private airstrip. Therefore, no impact related to airport land use compatibility relative to noise would occur.

Mitigation Measures: No mitigation is required.

¹⁵ Imperial County Planning and Development Services, *Brawley Municipal Airport Land Use Compatibility Map*, <https://www.icpds.com/assets/planning/brawley-municipal-airport.pdf>, accessed April 10, 2025.

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3. California Department of Transportation, *Transportation Related Earthborne Vibrations*, 2002.
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15. Michael Baker International, *Brawley Mixed Use Master Plan Development - Traffic Analysis Update Memorandum*, , April 2025.
16. M.J. Hayne, et al, *Prediction of Crowd Noise*, Acoustics, November 2006.

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2. Roadway Construction Noise Model (Version 1.1), 2008.

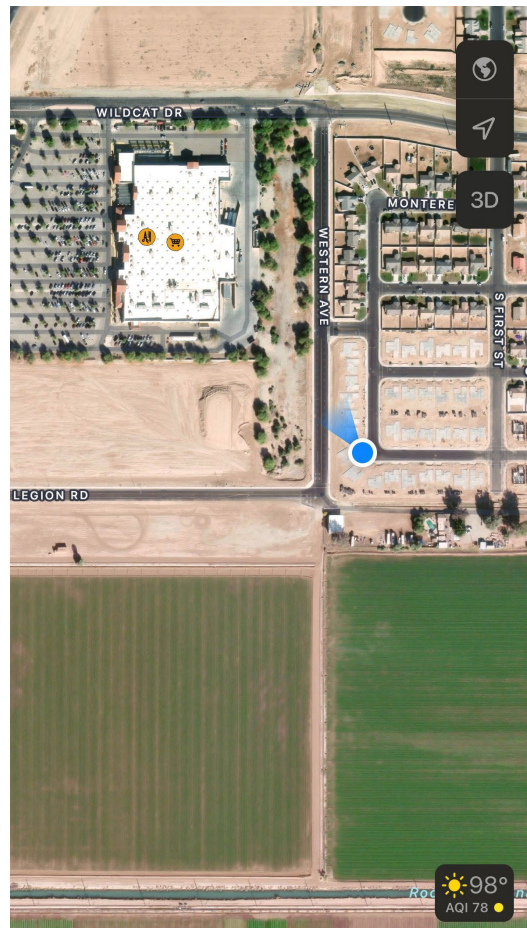
Appendix A

Noise Data

Site Number: NM-1		
Recorded By: Dennis Dinh, Oscar Escobar		
Job Number: 202590		
Date: 9/12/2024		
Time: 12:10 p.m.		
Location: In front of 102 Riata Street		
Source of Ambient Noise: Traffic along Riata Street and Western Avenue		
Noise Data		
L_{eq} (dB)	L_{max}(dB)	L_{min} (dB)
49.3	70.8	40.9

Equipment						
Category	Type	Vendor	Model	Serial No.	Cert. Date	Note
Sound	Sound Level Meter	Brüel & Kjær	2250	3011133	06/04/2023	
	Microphone	Brüel & Kjær	4189	3086765	06/04/2023	
	Preamp	Brüel & Kjær	ZC 0032	25380	06/04/2023	
	Calibrator	Brüel & Kjær	4231	2545667	06/04/2023	
Weather Data						
Est.	Duration: 10 minutes			Sky: Sunny		
	Note: dBA Offset = 0.03			Sensor Height (ft): 5 ft		
	Wind Ave Speed (mph / m/s)		Temperature (degrees Fahrenheit)		Barometer Pressure (inches)	
	5		98		29.57	

Photo of Measurement Location



2250

Instrument:		2250
Application:		BZ7225 Version 4.7.6
Start Time:		09/12/2024 12:10:29
End Time:		09/12/2024 12:20:29
Elapsed Time:		00:10:00
Bandwidth:		1/3-octave
Max Input Level:		142.23

	Time	Frequency
Broadband (excl. Peak):	FSI	AC
Broadband Peak:		C
Spectrum:	FS	Z

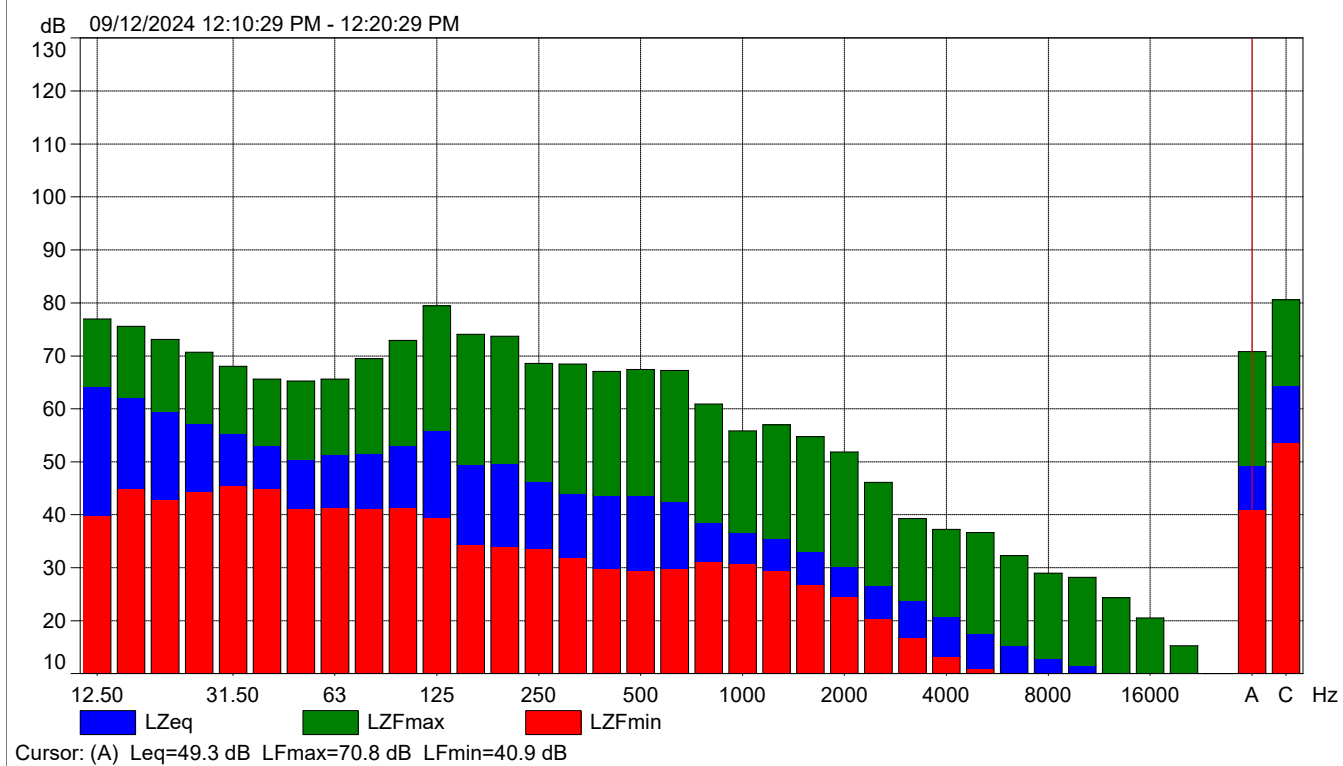
Instrument Serial Number:		3011133
Microphone Serial Number:		3086765
Input:		Top Socket
Windscreen Correction:		UA-1650
Sound Field Correction:		Free-field

Calibration Time:		09/12/2024 12:01:56
Calibration Type:		External reference
Sensitivity:		43.0958047509193 mV/Pa

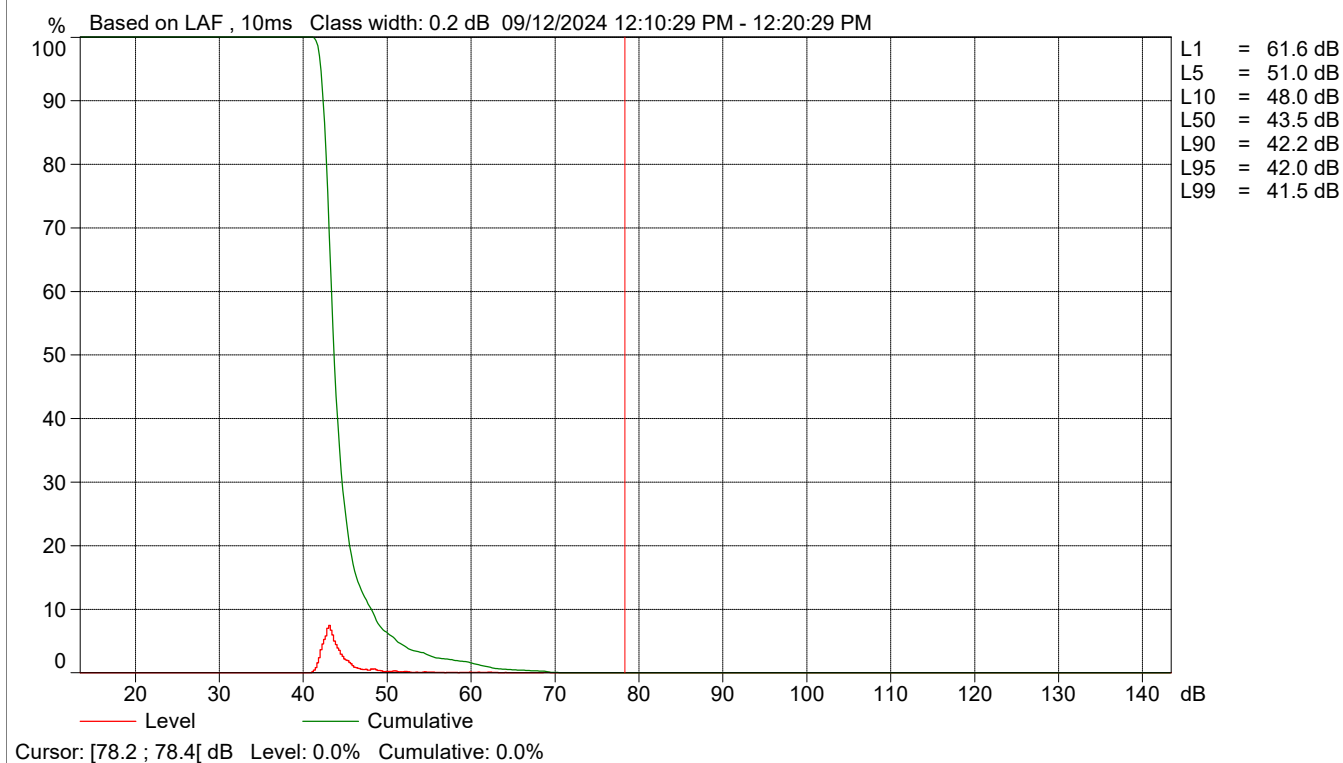
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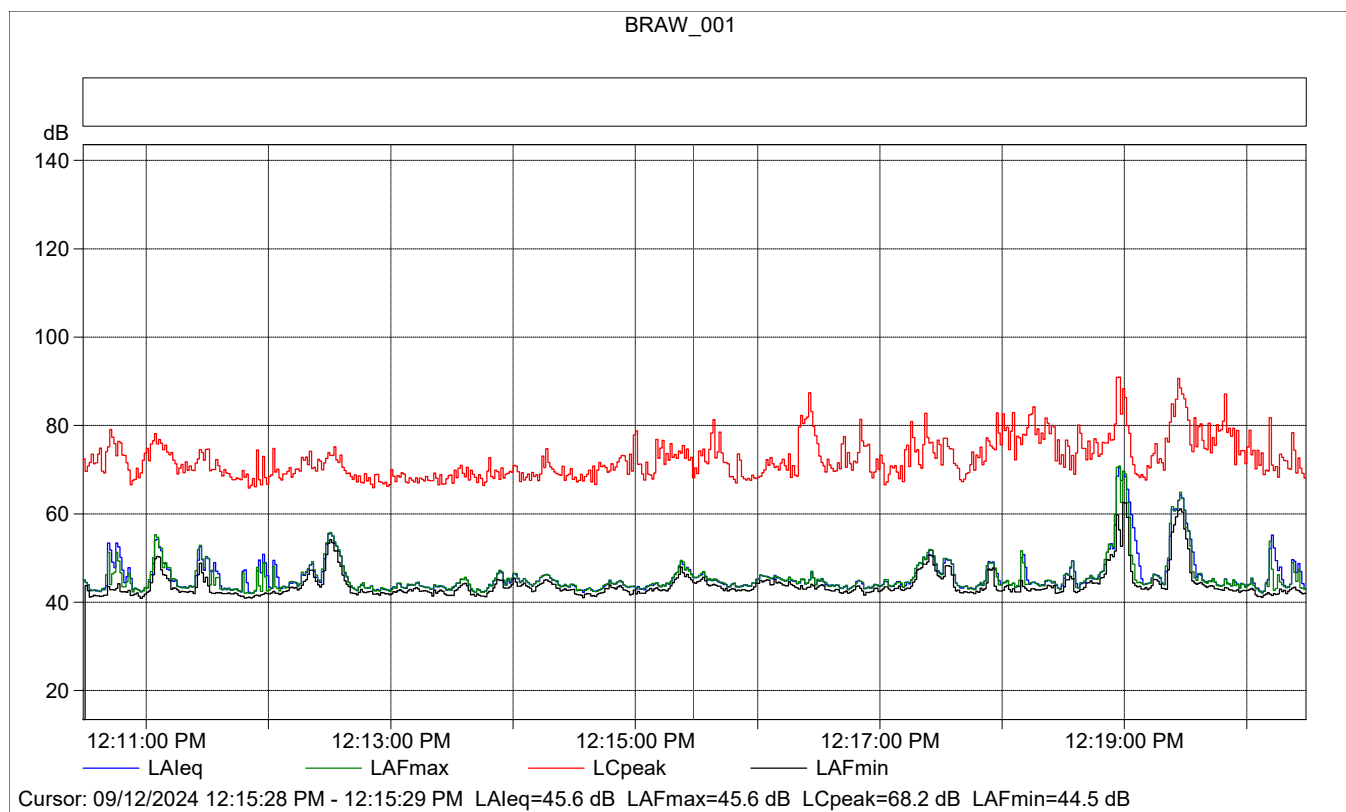
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Value				0.00	49.3	70.8	40.9
Time	12:10:29 PM	12:20:29 PM	0:10:00				
Date	09/12/2024	09/12/2024					

BRAW_001



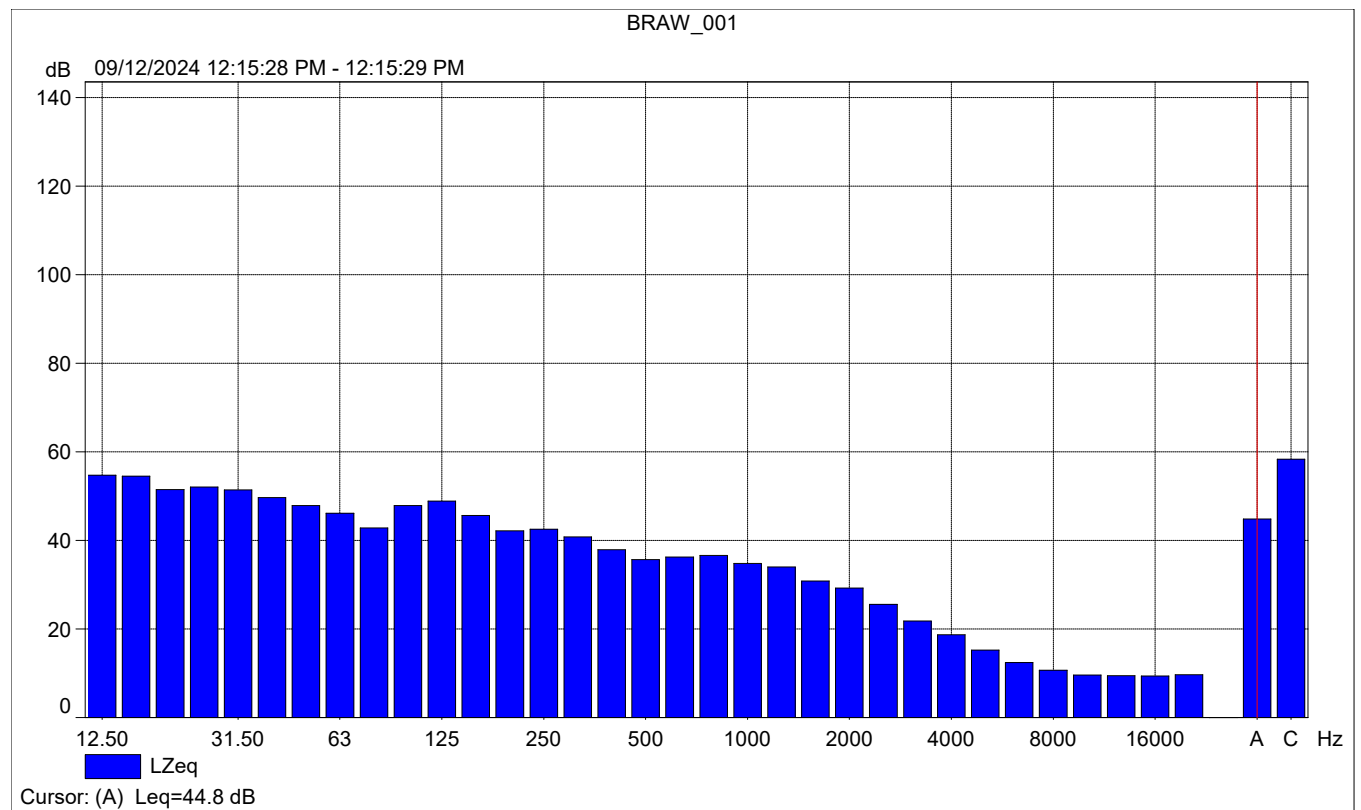
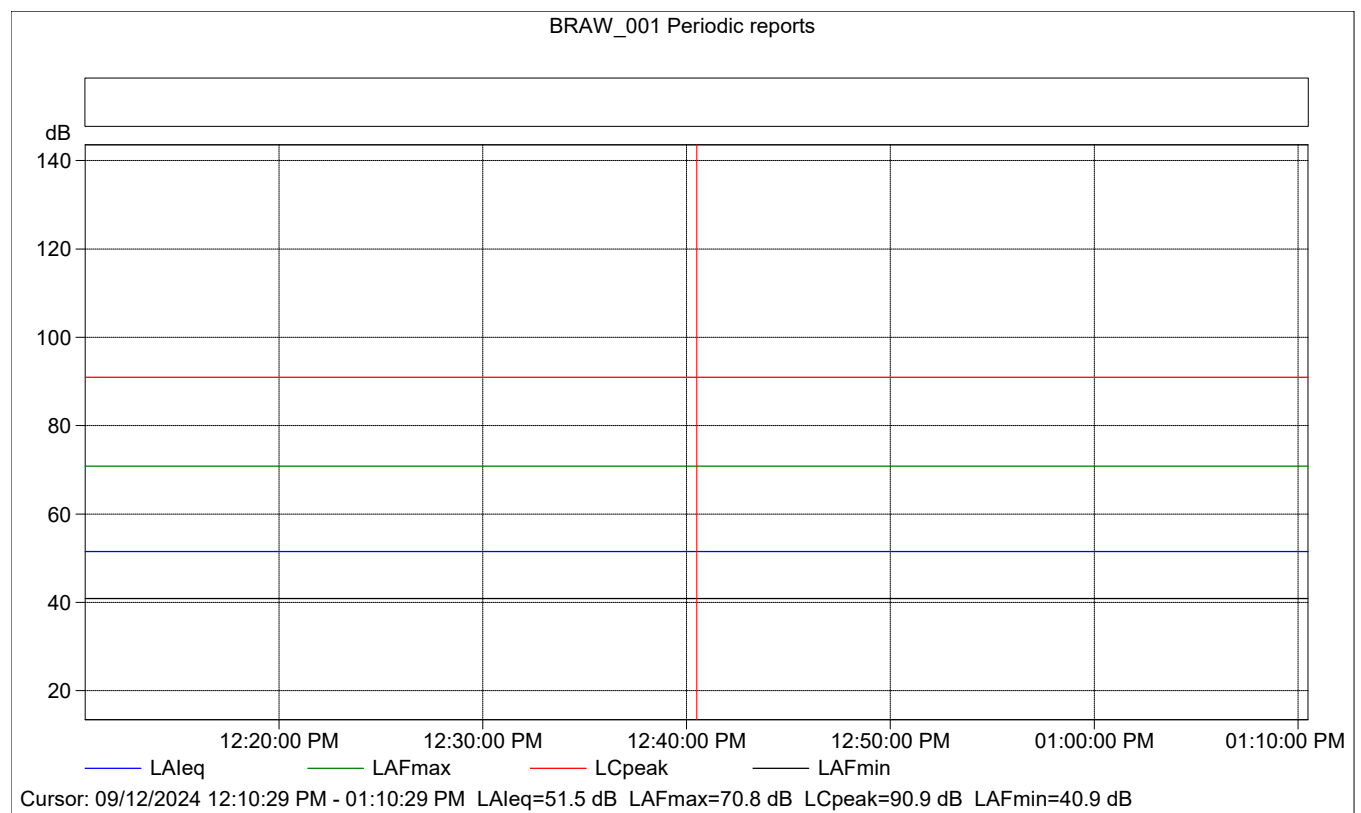
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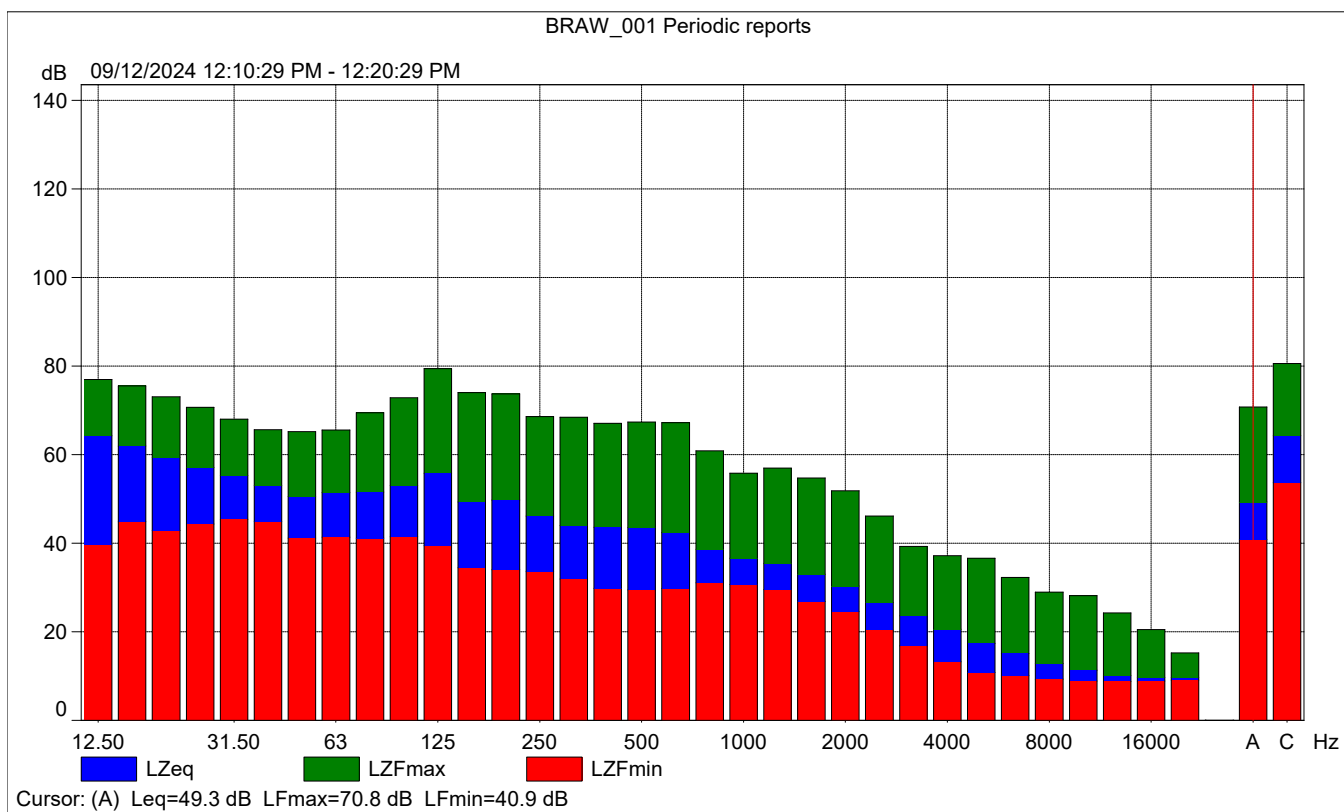
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	Start time	Elapsed time	Overload [%]	LAeq [dB]	LAFmax [dB]	LAFmin [dB]
Value			0.00	45.6	45.6	44.5
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Date	09/12/2024					

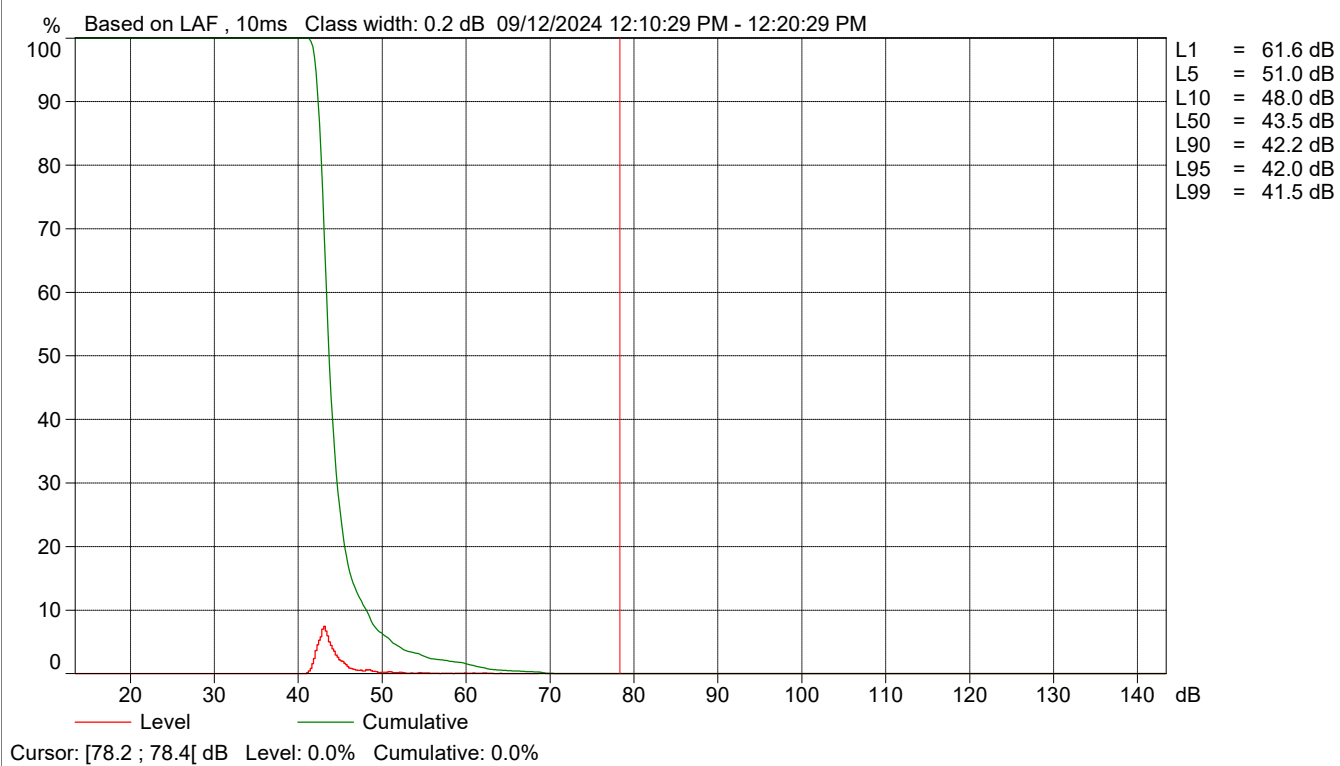


BRAW_001 Periodic reports

	Start time	Elapsed time	Overload [%]	LAFeq [dB]	LAFmax [dB]	LAFmin [dB]
Value			0.00	51.5	70.8	40.9
Time	12:10:29 PM	0:10:00				
Date	09/12/2024					



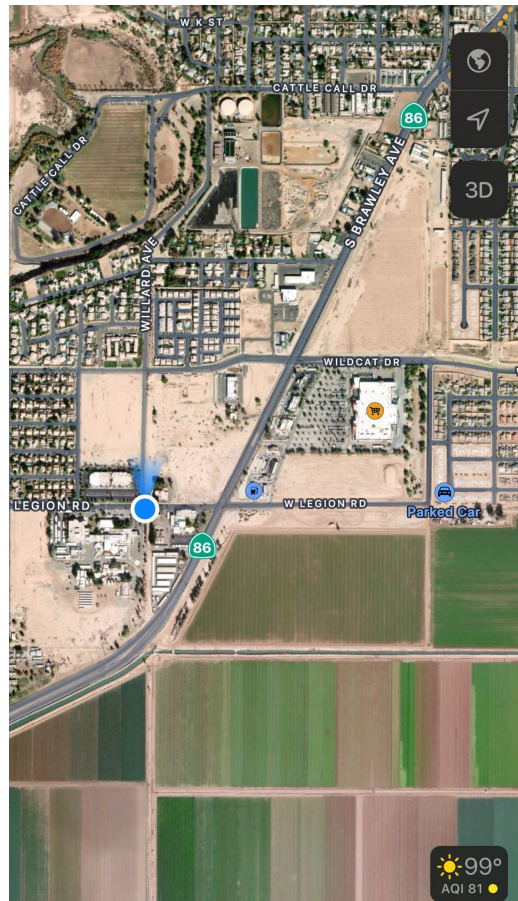
BRAW_001 Periodic reports



Site Number: NM-2		
Recorded By: Dennis Dinh, Oscar Escobar		
Job Number: 202590		
Date: 9/12/2024		
Time: 12:31 p.m.		
Location: Southwest corner of the West Legion Road and Williams Avenue intersection		
Source of Ambient Noise: Traffic along West Legion Road		
Noise Data		
L_{eq} (dB)	L_{max}(dB)	L_{min} (dB)
62.2	78.6	45.9

Equipment						
Category	Type	Vendor	Model	Serial No.	Cert. Date	Note
Sound	Sound Level Meter	Brüel & Kjær	2250	3011133	06/04/2023	
	Microphone	Brüel & Kjær	4189	3086765	06/04/2023	
	Preamp	Brüel & Kjær	ZC 0032	25380	06/04/2023	
	Calibrator	Brüel & Kjær	4231	2545667	06/04/2023	
Weather Data						
Est.	Duration: 10 minutes			Sky: Sunny		
	Note: dBA Offset = 0.03			Sensor Height (ft): 5 ft		
	Wind Ave Speed (mph / m/s)		Temperature (degrees Fahrenheit)		Barometer Pressure (inches)	
	5		98		29.57	

Photo of Measurement Location



2250

Instrument:		2250
Application:		BZ7225 Version 4.7.6
Start Time:		09/12/2024 12:31:07
End Time:		09/12/2024 12:41:07
Elapsed Time:		00:10:00
Bandwidth:		1/3-octave
Max Input Level:		142.23

	Time	Frequency
Broadband (excl. Peak):	FSI	AC
Broadband Peak:		C
Spectrum:	FS	Z

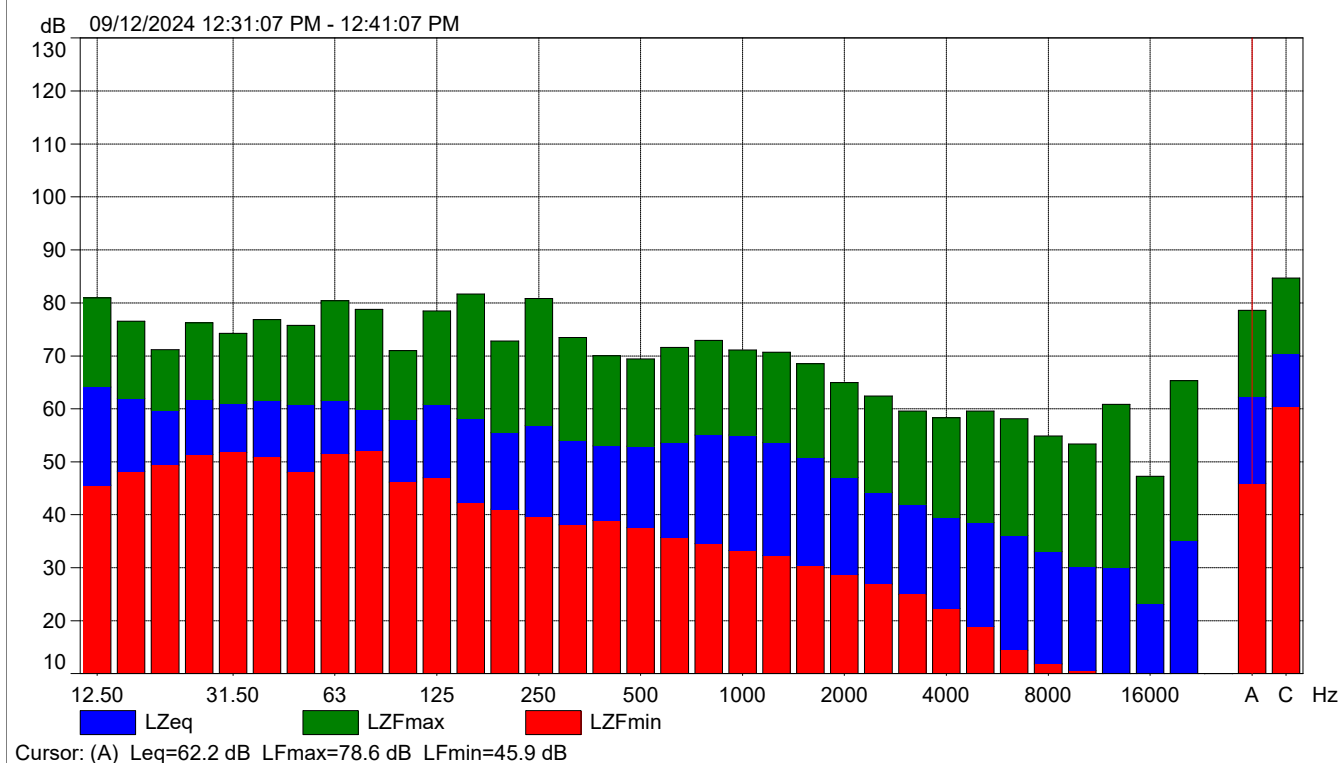
Instrument Serial Number:		3011133
Microphone Serial Number:		3086765
Input:		Top Socket
Windscreen Correction:		UA-1650
Sound Field Correction:		Free-field

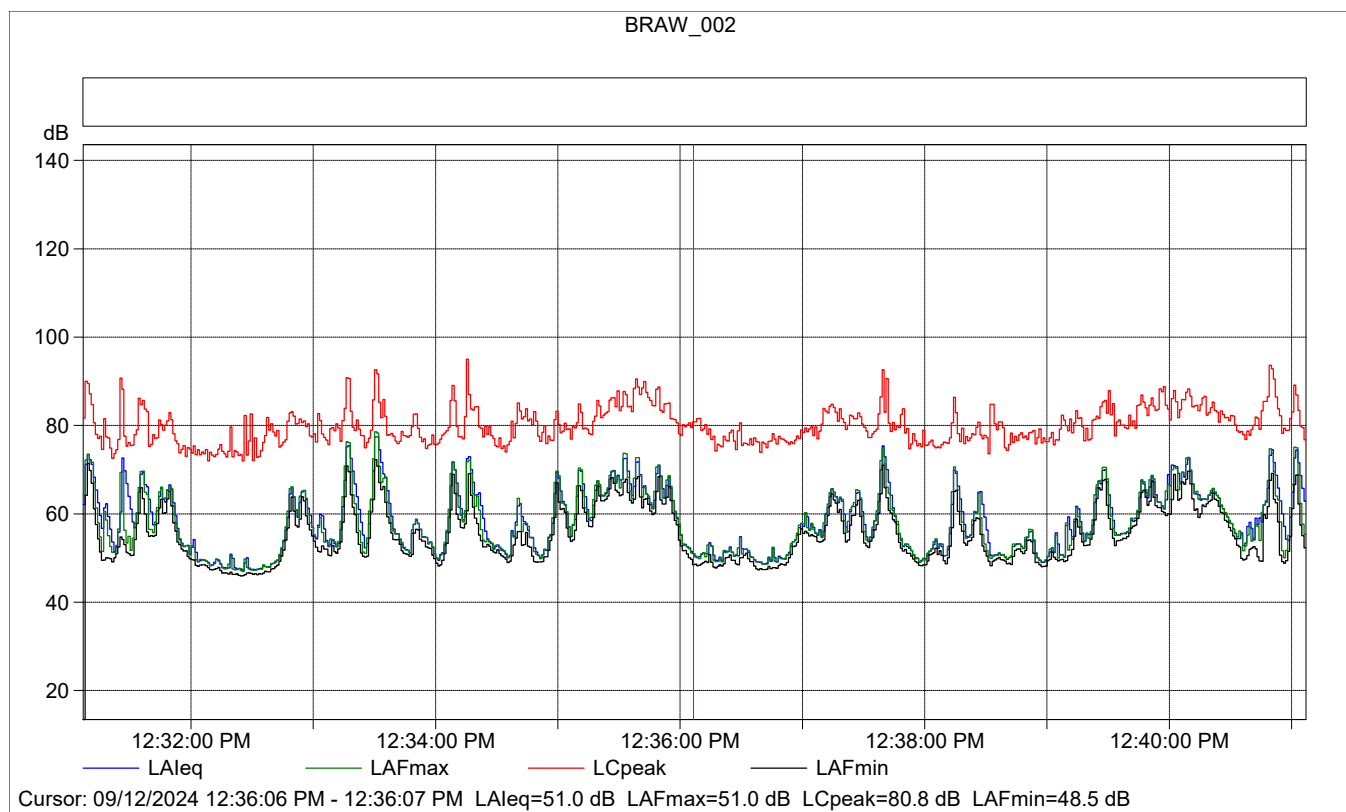
Calibration Time:		09/12/2024 12:01:56
Calibration Type:		External reference
Sensitivity:		43.0958047509193 mV/Pa

BRAW_002

	Start time	End time	Elapsed time	Overload [%]	LAeq [dB]	LAFmax [dB]	LAFmin [dB]
Value				0.00	62.2	78.6	45.9
Time	12:31:07 PM	12:41:07 PM	0:10:00				
Date	09/12/2024	09/12/2024					

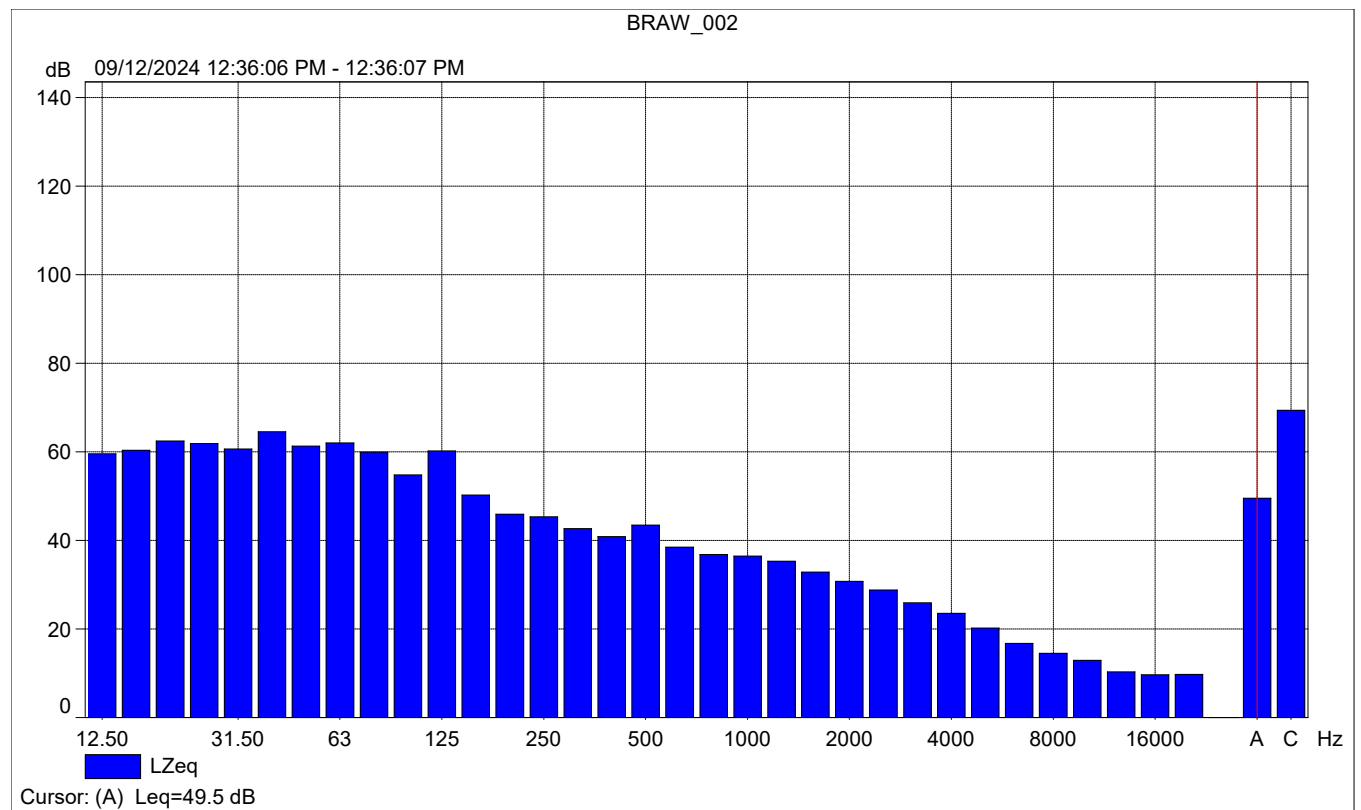
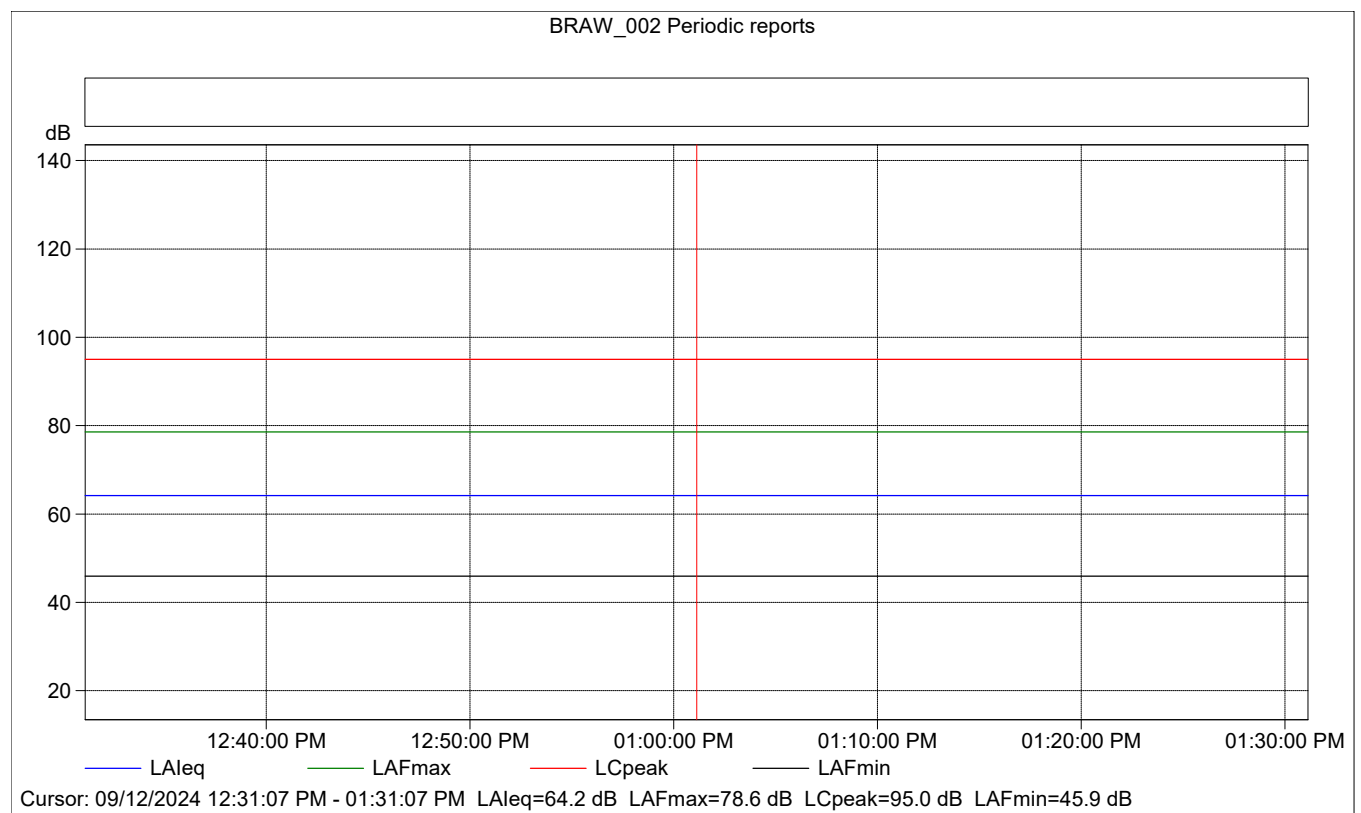
BRAW_002





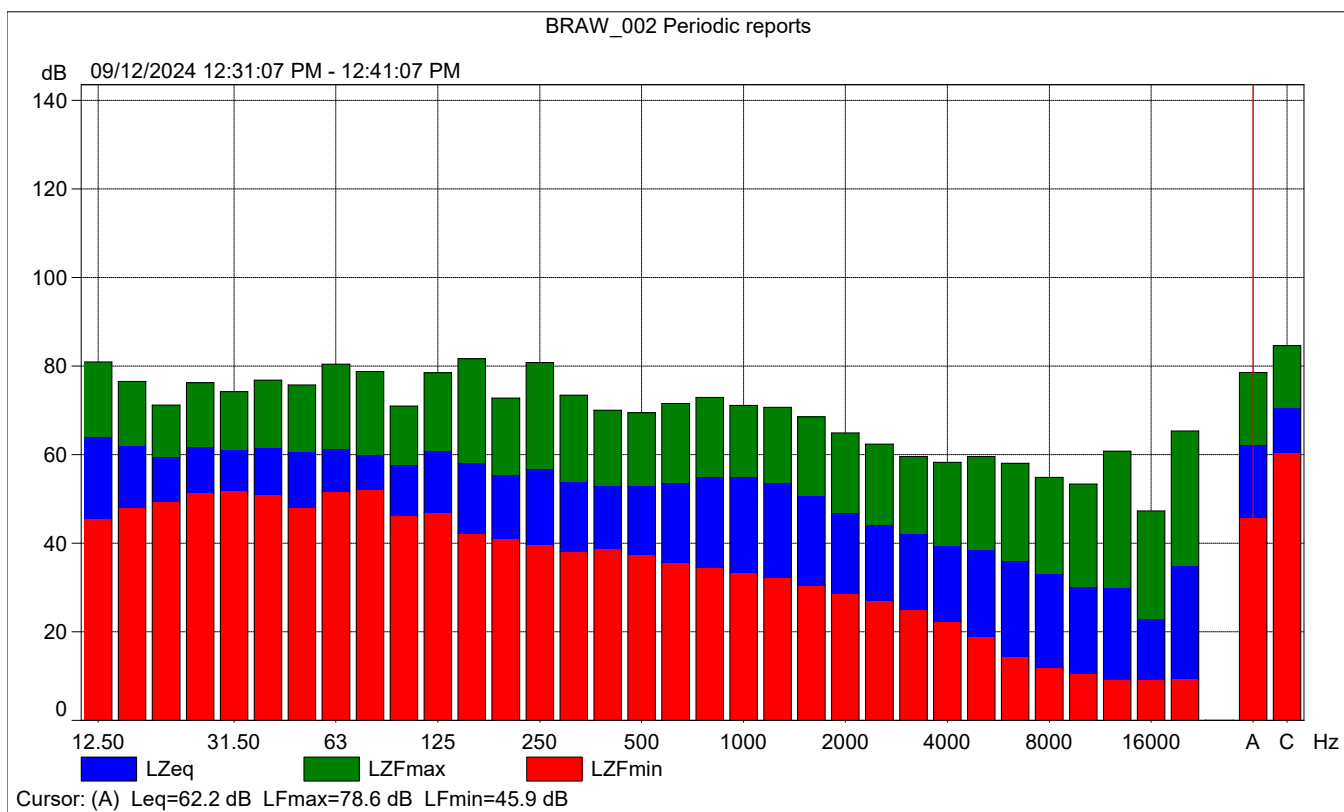
BRAW_002

	Start time	Elapsed time	Overload [%]	LAeq [dB]	LAFmax [dB]	LAFmin [dB]
Value			0.00	51.0	51.0	48.5
Time	12:36:06 PM	0:00:01				
Date	09/12/2024					

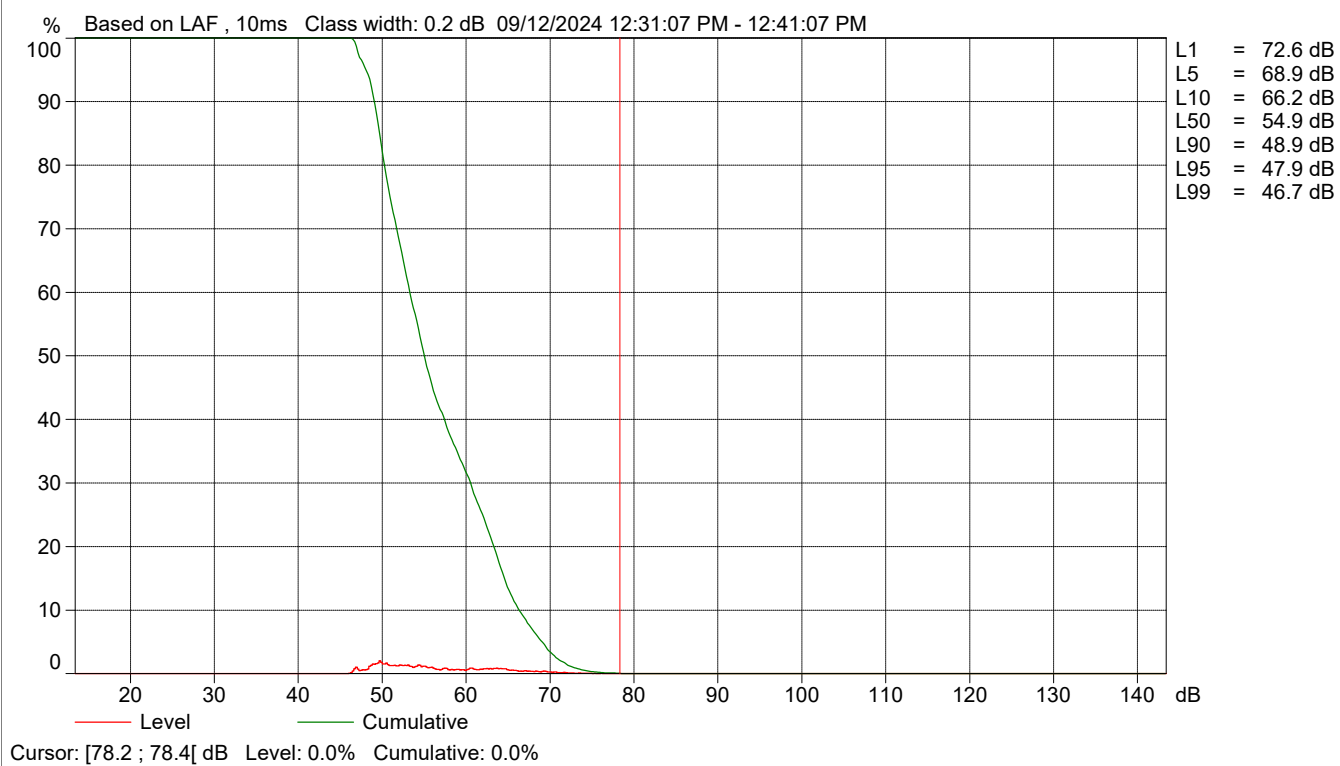


BRAW_002 Periodic reports

	Start time	Elapsed time	Overload [%]	LAFeq [dB]	LAFmax [dB]	LAFmin [dB]
Value			0.00	64.2	78.6	45.9
Time	12:31:07 PM	0:10:00				
Date	09/12/2024					



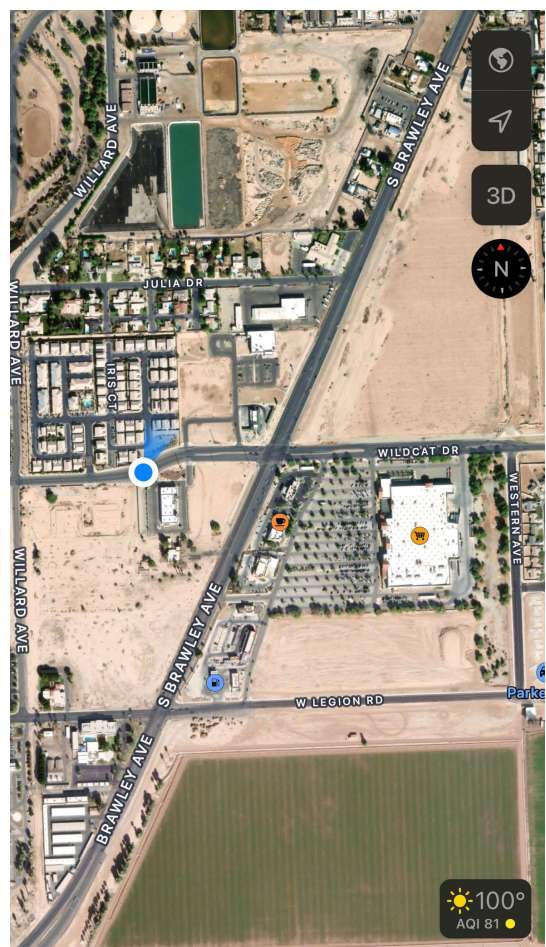
BRAW_002 Periodic reports



Site Number: NM-3		
Recorded By: Dennis Dinh, Oscar Escobar		
Job Number: 202590		
Date: 9/12/2024		
Time: 12:47 p.m.		
Location: Approximately 600 feet west of the Highway 86 and Panno Drive intersection		
Source of Ambient Noise: Traffic along Panno Drive		
Noise Data		
L_{eq} (dB)	L_{max}(dB)	L_{min} (dB)
60.0	75.3	39.6

Equipment						
Category	Type	Vendor	Model	Serial No.	Cert. Date	Note
Sound	Sound Level Meter	Brüel & Kjær	2250	3011133	06/04/2023	
	Microphone	Brüel & Kjær	4189	3086765	06/04/2023	
	Preamp	Brüel & Kjær	ZC 0032	25380	06/04/2023	
	Calibrator	Brüel & Kjær	4231	2545667	06/04/2023	
Weather Data						
Est.	Duration: 10 minutes			Sky: Sunny		
	Note: dBA Offset = 0.03			Sensor Height (ft): 5 ft		
	Wind Ave Speed (mph / m/s)		Temperature (degrees Fahrenheit)		Barometer Pressure (inches)	
	5		98		29.57	

Photo of Measurement Location



2250

Instrument:		2250
Application:		BZ7225 Version 4.7.6
Start Time:		09/12/2024 12:47:19
End Time:		09/12/2024 12:57:19
Elapsed Time:		00:10:00
Bandwidth:		1/3-octave
Max Input Level:		142.23

	Time	Frequency
Broadband (excl. Peak):	FSI	AC
Broadband Peak:		C
Spectrum:	FS	Z

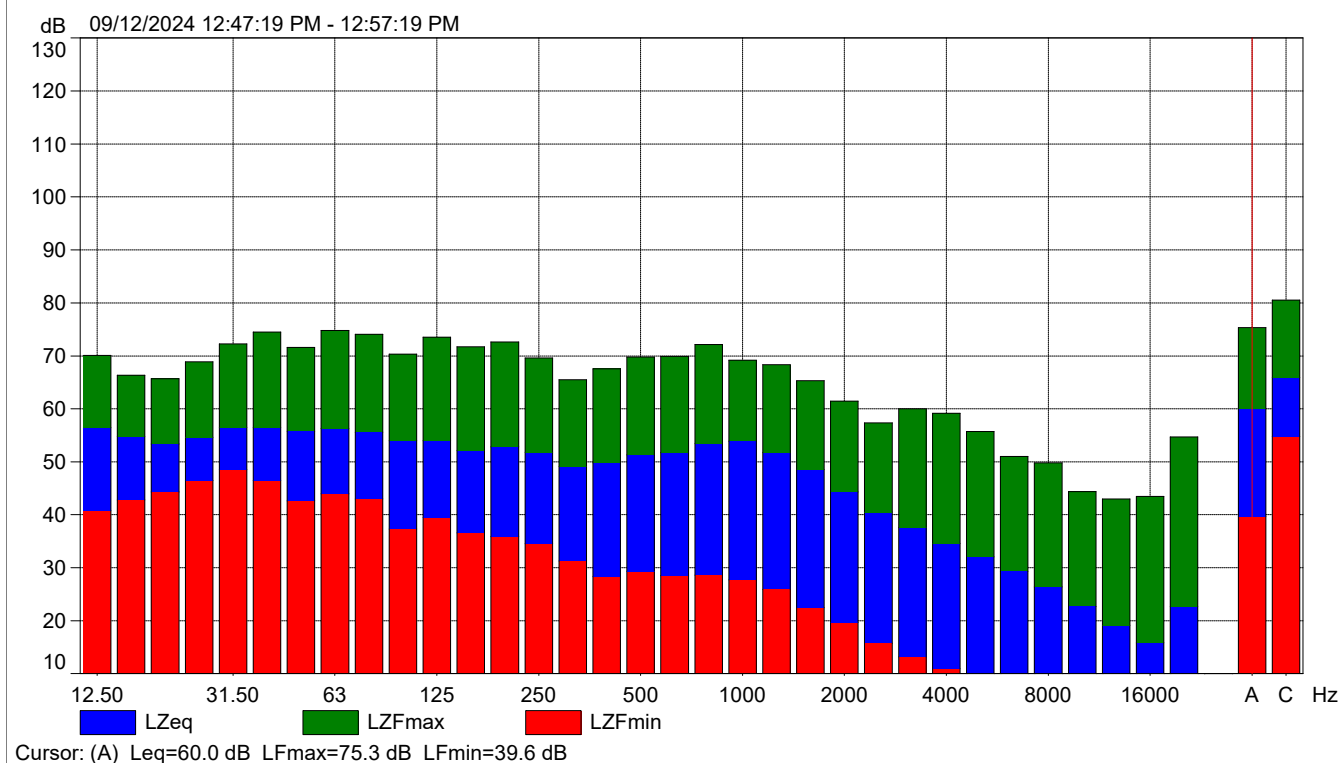
Instrument Serial Number:		3011133
Microphone Serial Number:		3086765
Input:		Top Socket
Windscreen Correction:		UA-1650
Sound Field Correction:		Free-field

Calibration Time:		09/12/2024 12:01:56
Calibration Type:		External reference
Sensitivity:		43.0958047509193 mV/Pa

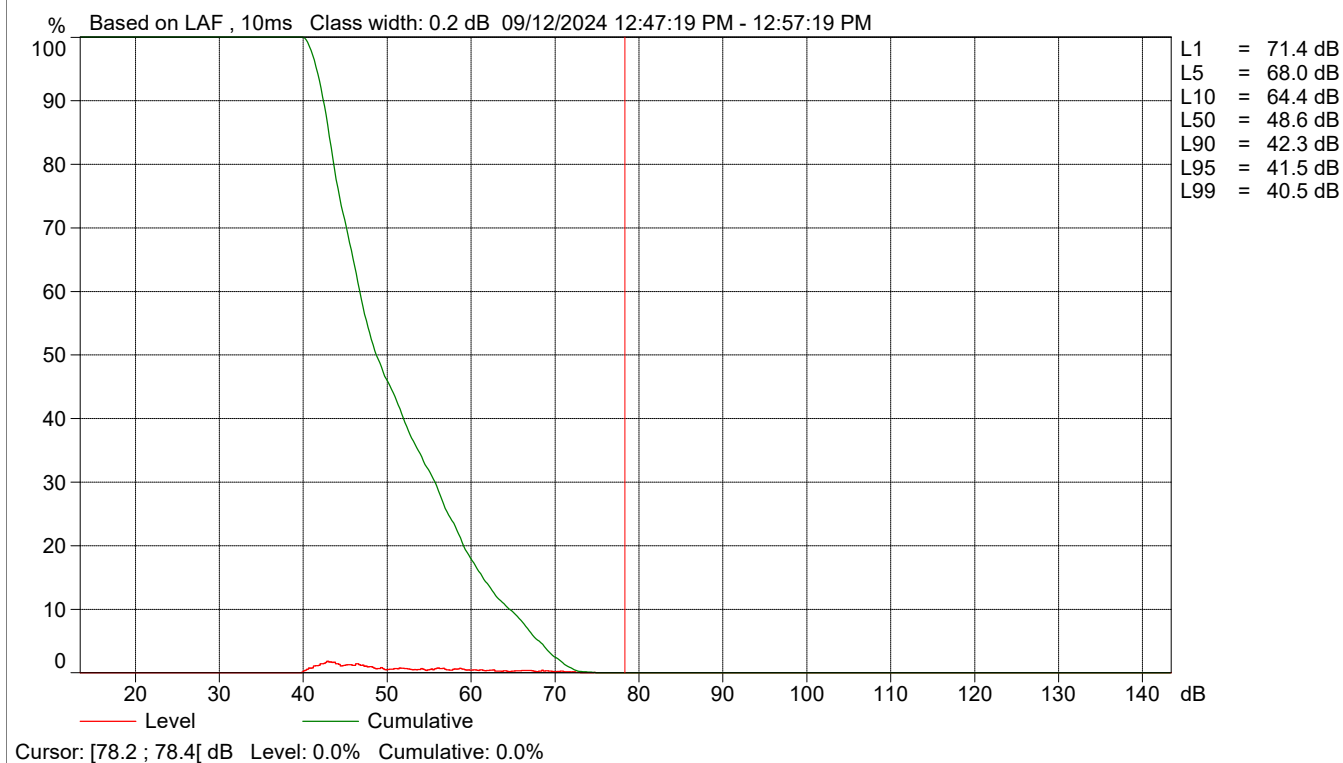
BRAW_003

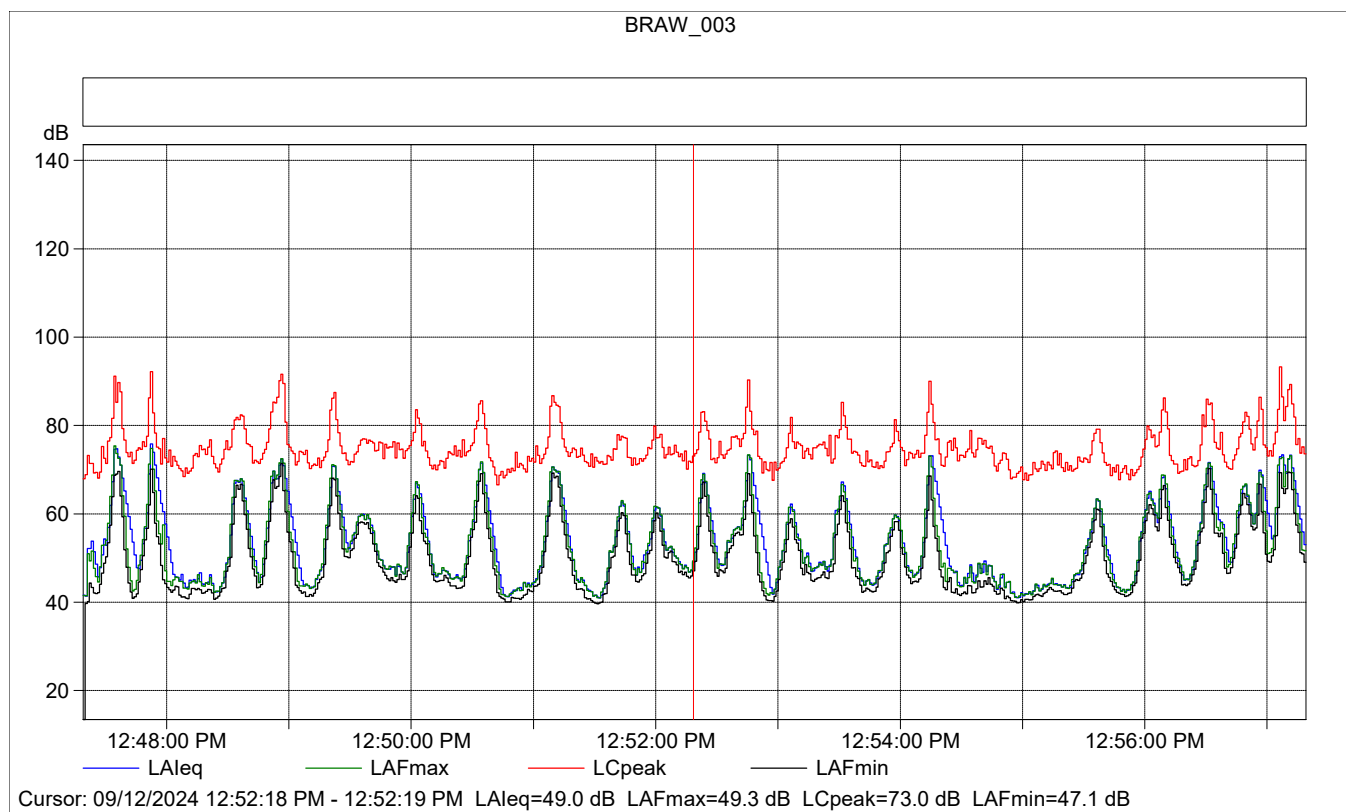
	Start time	End time	Elapsed time	Overload [%]	LAeq [dB]	LAFmax [dB]	LAFmin [dB]
Value				0.00	60.0	75.3	39.6
Time	12:47:19 PM	12:57:19 PM	0:10:00				
Date	09/12/2024	09/12/2024					

BRAW_003



BRAW_003





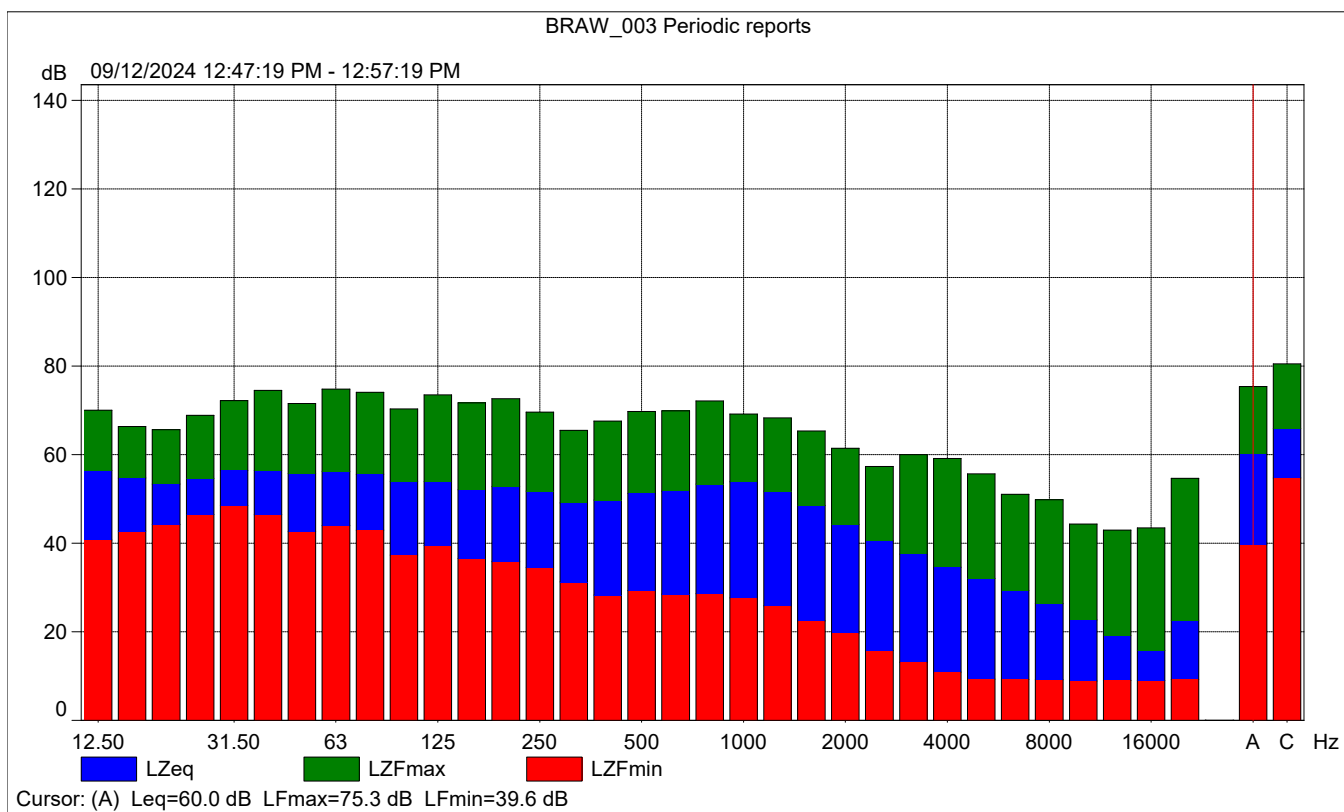
BRAW_003

	Start time	Elapsed time	Overload [%]	LAeq [dB]	LAFmax [dB]	LAFmin [dB]
Value			0.00	49.0	49.3	47.1
Time	12:52:18 PM	0:00:01				
Date	09/12/2024					

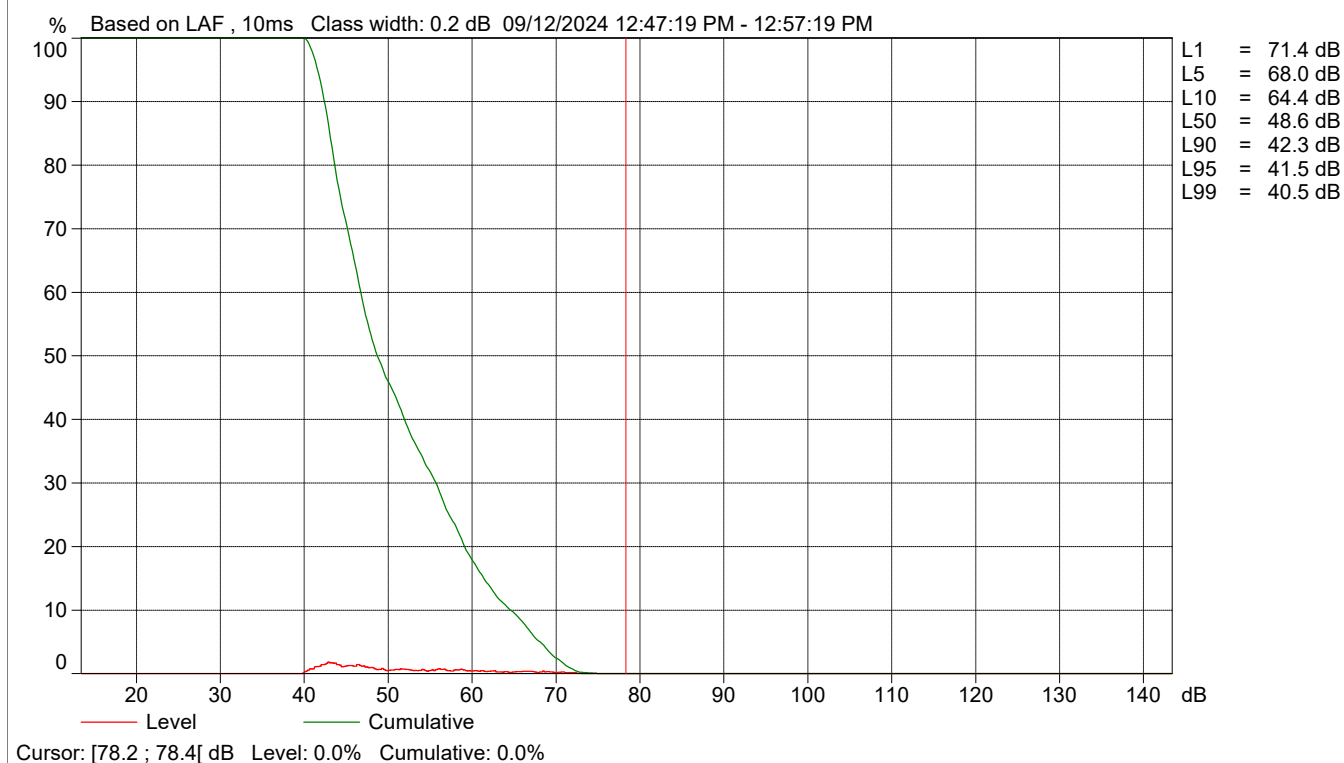
Cursor: 09/12/2024 12:47:19 PM - 01:47:19 PM LAeq=62.2 dB LAFmax=75.3 dB LCpeak=93.2 dB LAFmin=39.6 dB

BRAW_003 Periodic reports

	Start time	Elapsed time	Overload [%]	LAFeq [dB]	LAFmax [dB]	LAFmin [dB]
Value			0.00	62.2	75.3	39.6
Time	12:47:19 PM	0:10:00				
Date	09/12/2024					



BRAW_003 Periodic reports



Roadway Construction Noise Model (RCNM),Version 1.1

Report date #####

Case Descr Grading

---- Receptor #1 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Single-Fam Residential		65	65	65

		Equipment				
		Impact	Spec	Actual	Receptor	Estimated
		Device	Usage(%)	Lmax (dBA)	Distance (feet)	Shielding (dBA)
Excavator	No		40	80.7	1405	0
Excavator	No		40	80.7	1405	0
Grader	No		40	85	1405	0
Dozer	No		40	81.7	1405	0
Scraper	No		40	83.6	1405	0
Scraper	No		40	83.6	1405	0
Tractor	No		40	84	1405	0
Tractor	No		40	84	1405	0

Results

		Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
		Day		Evening		Night		Day		Evening		Night			
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq		
Excavator		51.7	47.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Excavator		51.7	47.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Grader		56	52	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Dozer		52.7	48.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Scraper		54.6	50.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Scraper		54.6	50.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Tractor		55	51	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Tractor		55	51	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Total		56	59.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Church	Commercial	65	65	65

		Equipment				
		Impact	Spec	Actual	Receptor	Estimated
		Device	Usage(%)	Lmax (dBA)	Distance (feet)	Shielding (dBA)
Excavator	No		40	80.7	1205	0
Excavator	No		40	80.7	1205	0
Grader	No		40	85	1205	0
Dozer	No		40	81.7	1205	0
Scraper	No		40	83.6	1205	0
Scraper	No		40	83.6	1205	0
Tractor	No		40	84	1205	0
Tractor	No		40	84	1205	0

Results

		Calculated (dBA)			Noise Limits (dBA)				Noise Limit Exceedance (dBA)						
		Day			Evening		Night		Day		Evening		Night		
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	
Excavator		53.1	49.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Excavator		53.1	49.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Grader		57.4	53.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Dozer		54	50.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Scraper		55.9	52	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Scraper		55.9	52	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Tractor		56.4	52.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Tractor		56.4	52.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Total		57.4	60.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date #####

Case Descr Construction

---- Receptor #1 ----

		Baselines (dBA)					
Description	Land Use	Daytime	Evening	Night			
Single-Fam Residential		65	65	65			
		Equipment					
			Spec	Actual	Receptor	Estimated	
	Impact		Lmax	Lmax	Distance	Shielding	
Description	Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)	
Crane	No	16		80.6	1405	0	
Pickup Truck	No	40		75	1405	0	
Pickup Truck	No	40		75	1405	0	
Pickup Truck	No	40		75	1405	0	
Generator	No	50		80.6	1405	0	
Tractor	No	40	84		1405	0	
Tractor	No	40	84		1405	0	
Tractor	No	40	84		1405	0	
Welder / Torch	No	40		74	1405	0	

Results

	Calculated (dBA)			Noise Limits (dBA)					Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Crane	51.6	43.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pickup Truck	46	42	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pickup Truck	46	42	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pickup Truck	46	42	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	51.7	48.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	55	51	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	55	51	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	55	51	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Welder / Torch	45	41	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	55	57.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

		Baselines (dBA)					
Description	Land Use	Daytime	Evening	Night			
Church	Commercial	65	65	65			
		Equipment					
	Impact		Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)	
Description	Device	Usage(%)					
Crane	No		16	80.6	1205	0	
Pickup Truck	No		40	75	1205	0	
Pickup Truck	No		40	75	1205	0	
Pickup Truck	No		40	75	1205	0	
Generator	No		50	80.6	1205	0	
Tractor	No		40	84	1205	0	
Tractor	No		40	84	1205	0	
Tractor	No		40	84	1205	0	
Welder / Torch	No		40	74	1205	0	

Results

	Calculated (dBA)			Noise Limits (dBA)					Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Crane	52.9	45	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pickup Truck	47.4	43.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pickup Truck	47.4	43.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pickup Truck	47.4	43.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	53	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	56.4	52.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	56.4	52.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	56.4	52.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Welder / Torch	46.4	42.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	56.4	58.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM), Version 1.1

Report date #####

Case Descr Paving

---- Receptor #1 ----

Baselines (dBA)

Descriptor Land Use	Daytime	Evening	Night
Single-Fam Residential	65	65	65

Equipment

Description	Impact Device	Usage(%)	Spec	Actual	Receptor	Estimated
			Lmax	Lmax	Distance	Shielding
			(dBA)	(dBA)	(feet)	(dBA)
Paver	No	50		77.2	1405	0
Paver	No	50		77.2	1405	0
Paver	No	50		77.2	1405	0
Paver	No	50		77.2	1405	0
Roller	No	20		80	1405	0
Roller	No	20		80	1405	0

Results

Calculated (dBA)

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

[illegible]

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Church	Commercial	65	65	65

Equipment

Description	Impact Device	Usage(%)	Spec	Actual	Receptor	Estimated
			Lmax	Lmax	Distance	Shielding
			(dBA)	(dBA)	(feet)	(dBA)
Paver	No	50		77.2	1205	0
Paver	No	50		77.2	1205	0
Paver	No	50		77.2	1205	0
Paver	No	50		77.2	1205	0
Roller	No	20		80	1205	0
Roller	No	20		80	1205	0

Results

Calculated (dBA)

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

[illegible]

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM), Version 1.1

Report date: #####

Case Descr Coating

---- Receptor #1 ----

Baselines (dBA)

Descriptor Land Use	Daytime	Evening	Night
Single-Fam Residential	65	65	65

Equipment

			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)
Compressor (air)	No	40		77.7	1405	0

Results

Calculated (dBA)

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

[illegible]

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

Baselines (dBA)

Descriptor	Land Use	Daytime	Evening	Night
Church	Commercial	65	65	65

Equipment

		Spec	Actual	Receptor	Estimated
	Impact	Lmax	Lmax	Distance	Shielding
Description	Device	Usage(%)	(dBA)	(feet)	(dBA)
Compressor (air)	No	40	77.7	1205	0

Results

Calculated (dBA)

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

			Day		Evening		Night			Day		Evening		Night	
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq		Lmax	Leq	Lmax	Leq	Lmax	Leq
Compressor (air)		50	46.1	N/A	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A
Total		50	46.1	N/A	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.